



**DESIGN COMMISSION**  
**MONDAY, JANUARY 25, 2016 6:00 PM**  
**AUSTIN CITY HALL, BOARDS AND COMMISSIONS ROOM 1101**  
**301 W. SECOND STREET, AUSTIN, TEXAS 78701**

**Current Commission Members**

\_\_\_\_\_ Evan Taniguchi – Chair

\_\_\_\_\_ Ben Luckens

\_\_\_\_\_ Bart Whatley – Vice-Chair

\_\_\_\_\_ Samuel Franco

\_\_\_\_\_ Heyden Walker

\_\_\_\_\_ David Carroll

\_\_\_\_\_ Aan Coleman

\_\_\_\_\_ Martha Gonzales

\_\_\_\_\_ Melissa Henao-Robledo

\_\_\_\_\_ Jorge E. Rousselin (COA – PZD)  
Executive Liaison

**AGENDA**

Please note: Posted times are for time-keeping purposes only. The Commission may take any item(s) out of order and no express guarantee is given that any item(s) will be taken in order or at the time posted.

	Approx. time
<b>CALL TO ORDER AND ROLL CALL</b>	<b>6:00 PM</b>
<b>1. CITIZEN COMMUNICATION: GENERAL</b> The first five speakers signed up prior to the meeting being called to order will each be allowed a three-minute allotment to address their concerns regarding items not posted on the agenda.	<b>6:00 PM</b>
<b>2. APPROVAL OF MINUTES (Discussion and Possible Action):</b> None	<b>6:15 PM</b>
<b>3. NEW BUSINESS (Discussion and Possible Action):</b> a. Briefing on the Dove Springs Recreation Center Expansion project. (Laurie Limbacher/ <a href="#">Kevin Johnson</a> , COA-PARD).	<b>6:15 PM</b>
<b>4. OLD BUSINESS (Discussion and Possible Action):</b> b. Discussion and possible action on the 2016 Design Commission Meeting Schedule. c. Discussion and possible action on creation of Infrastructure Guidelines.	<b>6:15 PM</b>

<b>5. COMMITTEE AND LIAISON REPORTS (Discussion and Possible Action):</b> a. Standing Committees Reports; b. Working Group Reports; c. Liaison Reports; and d. Appointment of Committee/Working Group members by Chair.	<b>7:15 PM</b>
<b>6. STAFF BRIEFINGS:</b> None	<b>7:25PM</b>
<b>7. FUTURE AGENDA ITEMS:</b> None	<b>7:25 PM</b>
<b>8. ANNOUNCEMENTS:</b> a. Chair Announcements; b. Items from Commission Members; and c. Items from City Staff.	<b>7:30 PM</b>
<b>ADJOURNMENT</b>	<b>7:30 PM</b>

The City of Austin is committed to compliance with the American with Disabilities Act. Reasonable modifications and equal access to communications will be provided upon request. Meeting locations are planned with wheelchair access. If requiring Sign Language Interpreters or alternative formats, please give notice at least 2 days before the meeting date. Please contact Jorge Rousselin in the Planning and Zoning Department, at [jorge.rousselin@austintexas.gov](mailto:jorge.rousselin@austintexas.gov) or (512) 974-2975, for additional information. TTY users route through Relay Texas at 711.

## Design Commission Committees, Working Groups, and Liaisons

### Committees

1. Bylaws/Policies & Procedures Committee:
2. Executive Committee: E. Taniguchi, B. Whatley, H. Walker

### Working Groups

1. Planning and Urban Design Working Group: E. Taniguchi, H. Walker, B. Whatley, A. Coleman
2. Architecture and Development Working Group: B. Whatley, M. Gonzalez, D. Carroll
3. Landscape and Infrastructure Working Group: S. Franco, M. Henao-Robledo, A. Coleman, B. Luckens
4. Public Engagement Working Group: B. Luckens, S. Franco, M. Henao-Robledo

### Design Commission Liaisons

1. Downtown Comm. Liaison / Downtown Austin Plan: Samuel Franco
2. Airport Boulevard Redevelopment Initiative: Pending

### Design Commission Executive Liaison:

Jorge E. Rousselin, CNU-A

Development Services Process Coordinator

Urban Design, Planning and Zoning Department

City of Austin, One Texas Center, 505 Barton Springs Rd., Austin, TX 78704

Phone: (512) 974-2975 ■ E-mail: [jorge.rousselin@austintexas.gov](mailto:jorge.rousselin@austintexas.gov)

### Resources:

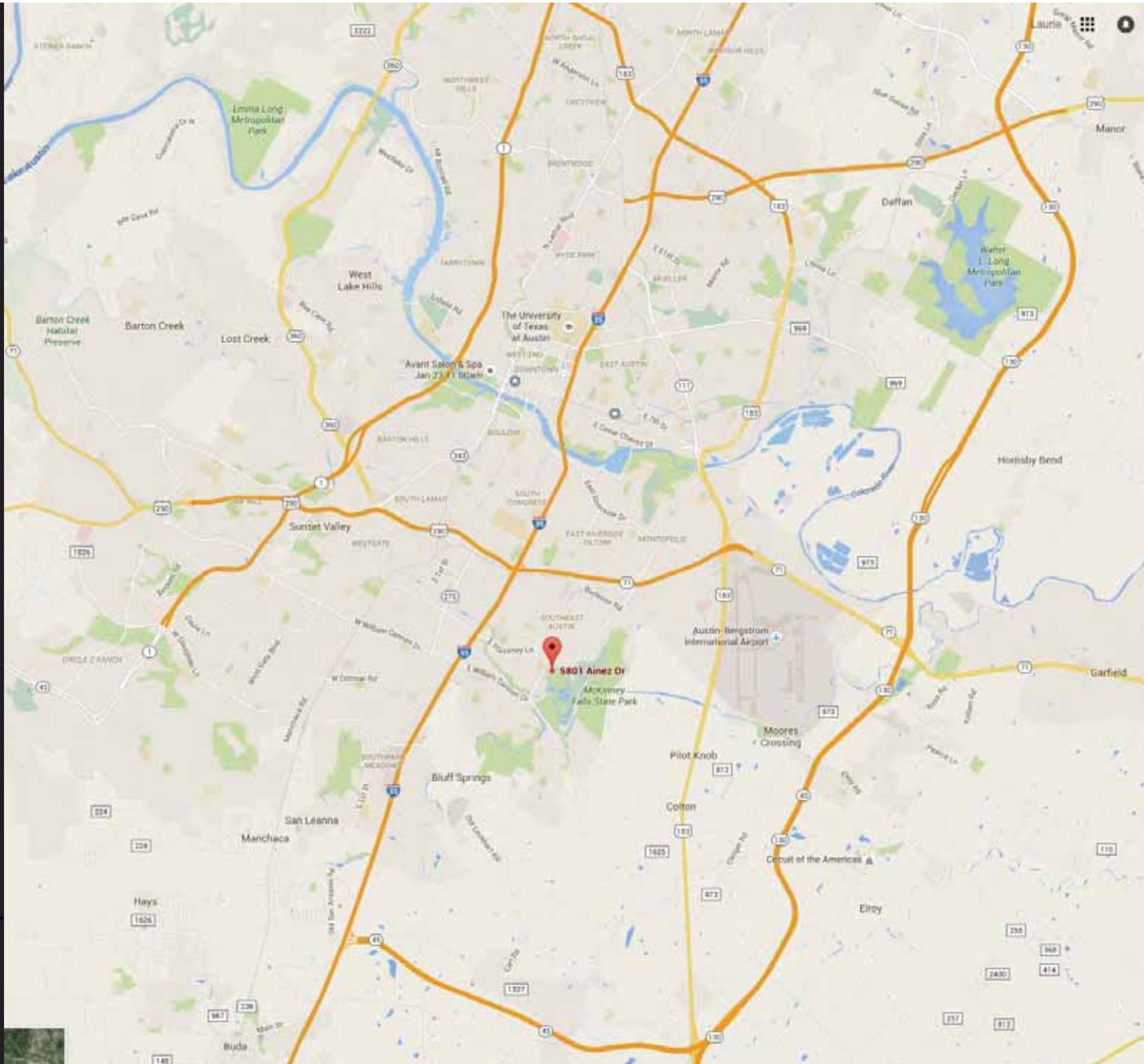
1. The Urban Design Guidelines for Austin can be accessed here:  
[Urban Design Guidelines for Austin](#).
2. Design Commission backup may be accessed here: [Design Commission Backup](#).

Briefing to the Design Commission

# DOVE SPRINGS RECREATION CENTER

January 25, 2016







# STAKEHOLDER ENGAGEMENT CONCEPTUAL DESIGN



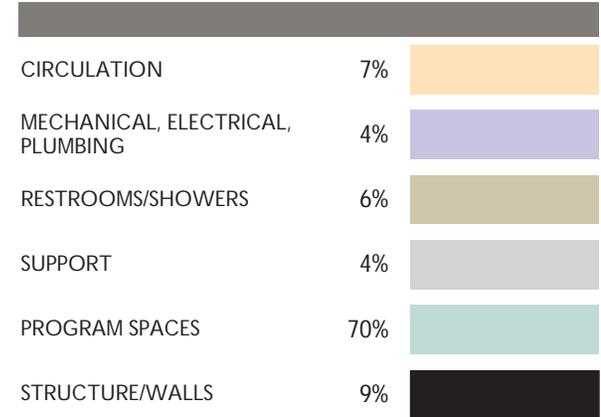


FLOOR PLAN

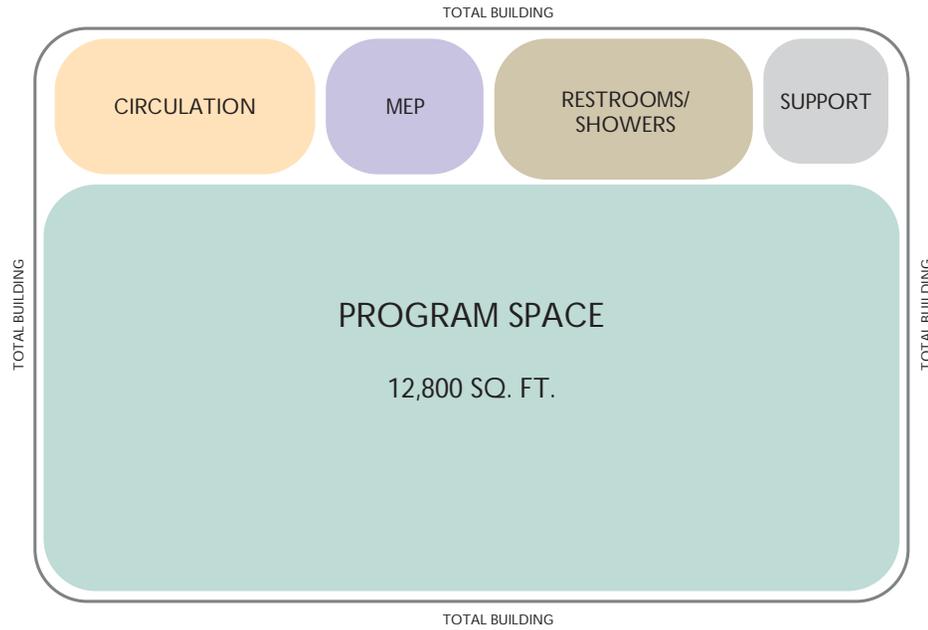


18,100 sq. ft.

TOTAL BUILDING 100%



18,100 SQ. FT.

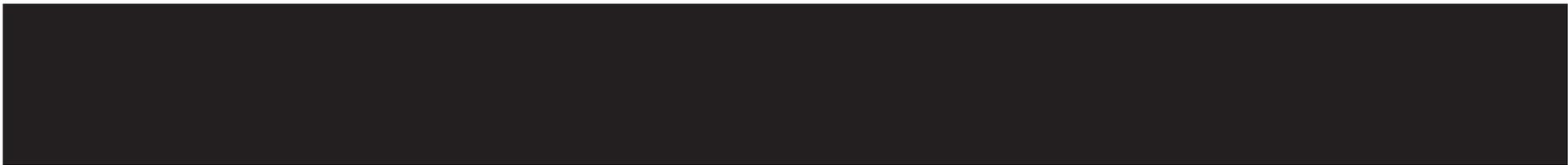


3,500 SQ. FT.



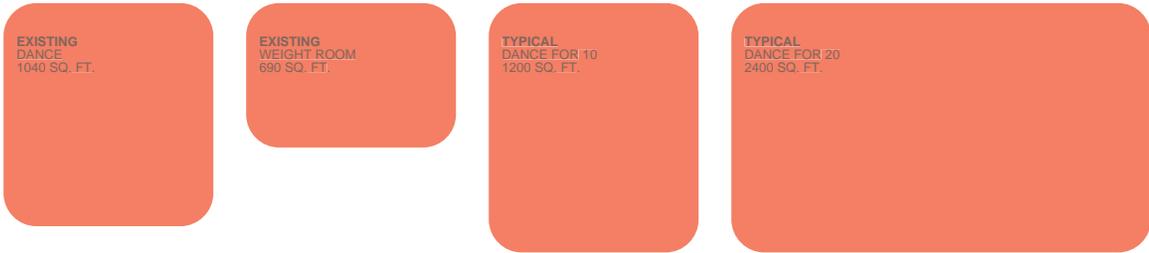
**NEW ADDITION**  
SPACE ALLOCATION DIAGRAM

**EXISTING BUILDING**  
SPACE ALLOCATION DIAGRAM

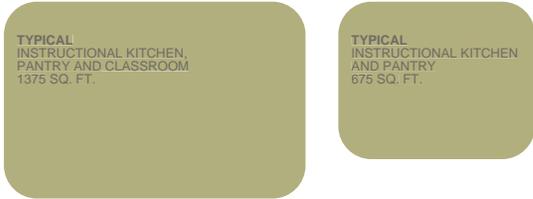
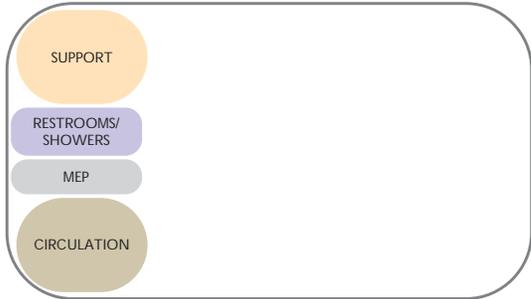




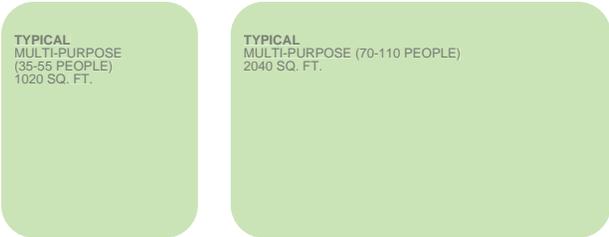
CLASSROOM/MULTI-PURPOSE, SMALL



FITNESS



KITCHEN, INSTRUCTIONAL



MULTI-PURPOSE, LARGE



RECREATION, SPECIFIC





September 18, 2014

ADDITION TO  
DOVE SPRINGS RECREATION CENTER

**DIAGRAM WORKSHEET**

SPACE	SIZE	COMMENTS
1 Typical Kitchen	675	Existing kitchen should serve as a multi space or hobby space.
2 Multi Purpose Classroom	910	
3 Multi Purpose Classroom	1200	
4 Recreation Area		
5 for expansion of multi purpose/fitness		
<b>TOTAL</b>		

With designer's license

## A DISTILLATION:

- A new Instructional Kitchen
- A new multi-purpose classroom.
- Repurpose APD.
- Improve functionality of staff spaces.
- One of these:
  - Improvements to Tiny Tots.
  - An additional multi-purpose classroom.
  - A multi-purpose classroom/fitness space.
  - New pool-table space.

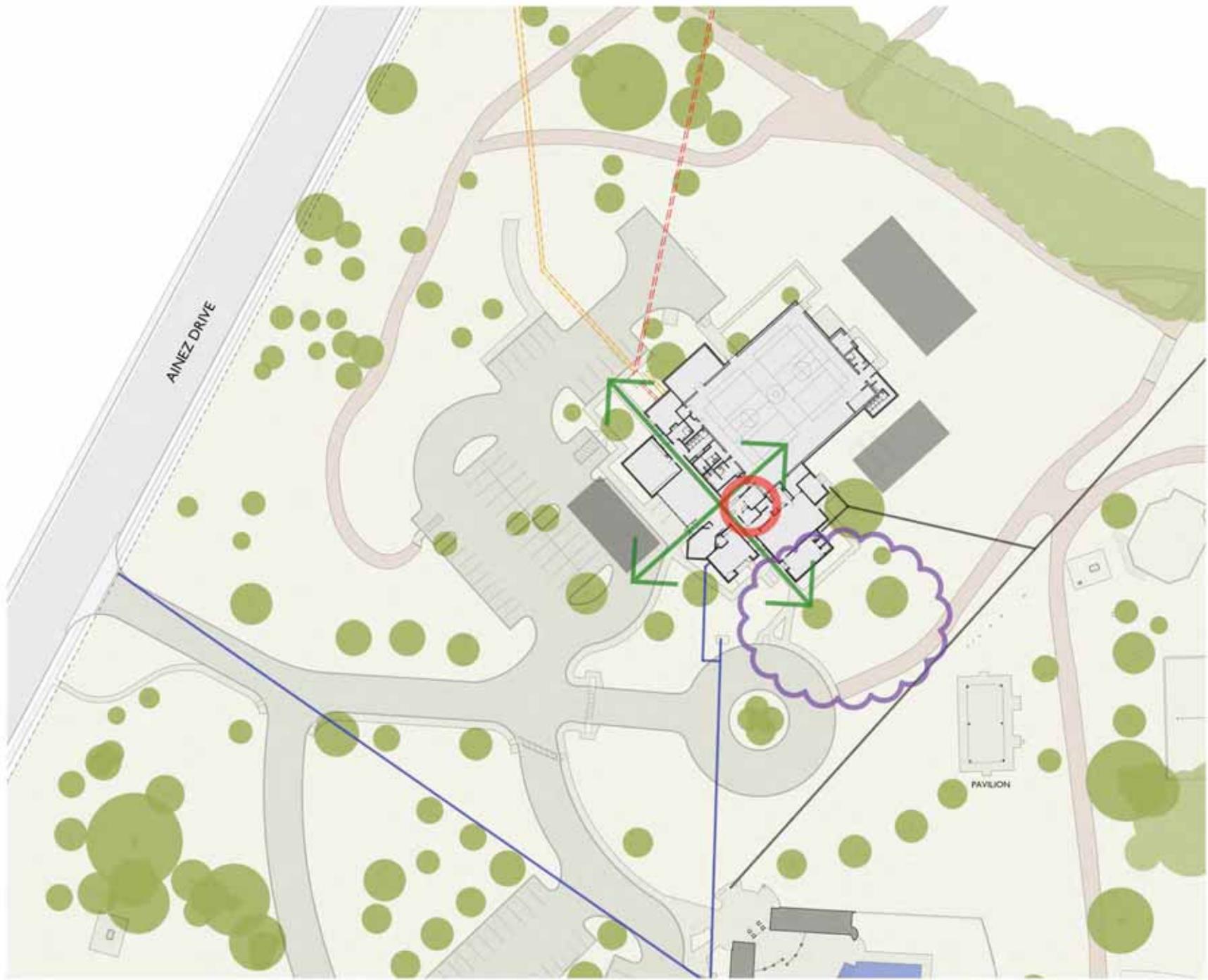
The not-so-obvious

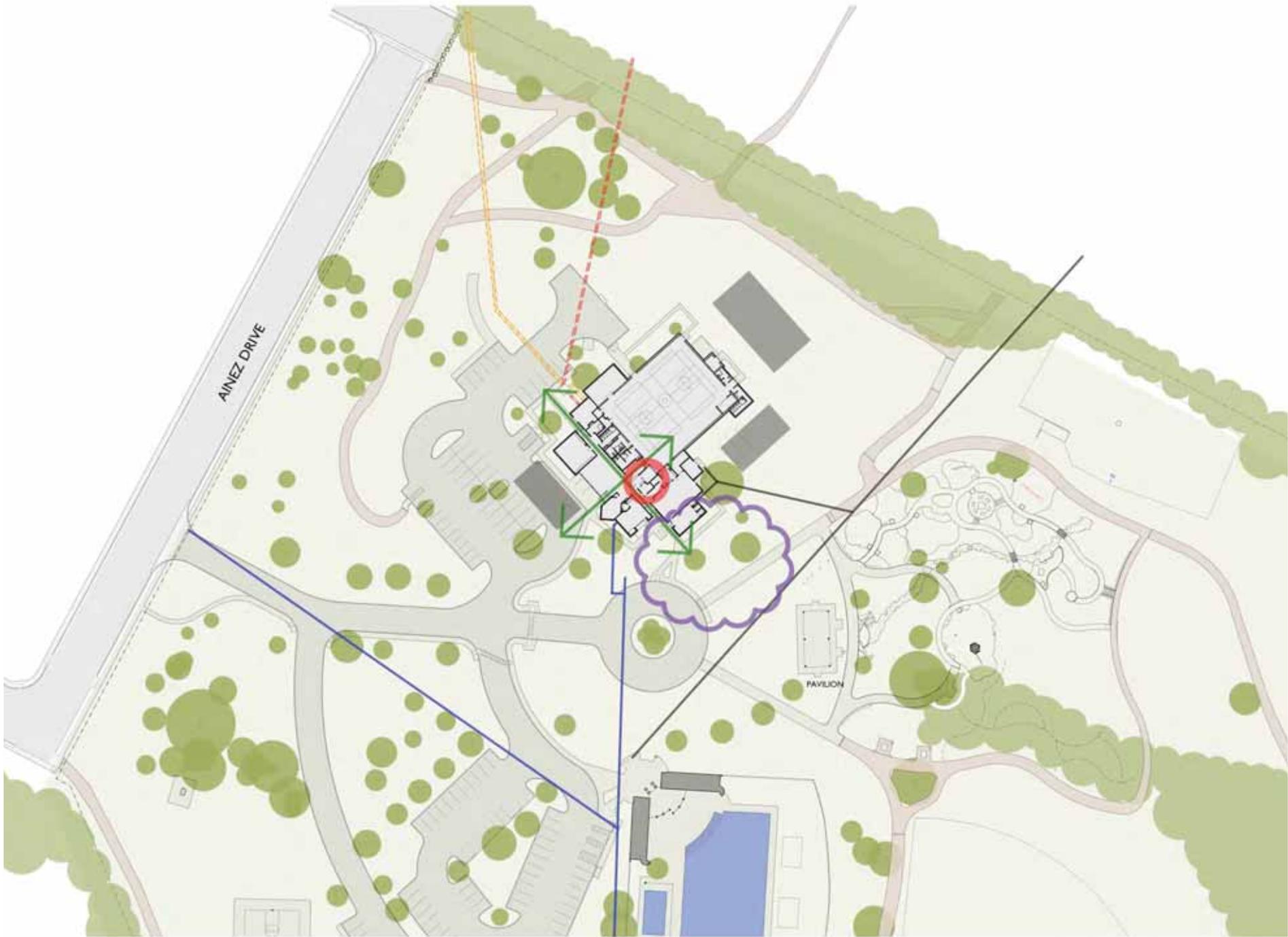
## PROJECT ELEMENTS:

- Additional Parking (9 spaces)
- Accessible Route (site).
- Accessibility upgrades (within existing building).
- Fire department access.
- Rain garden for water quality.
- New fire hydrant.





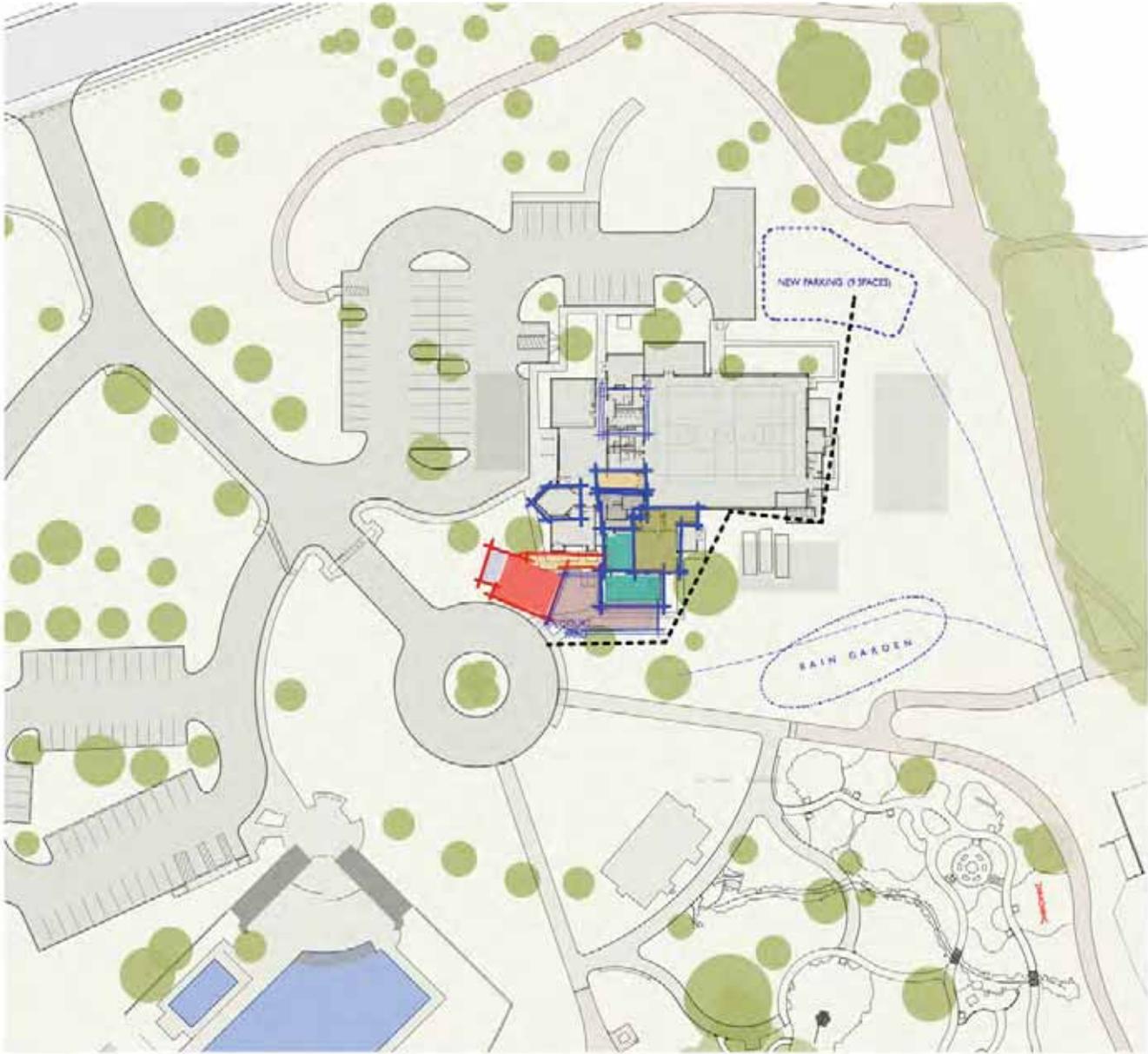






Concept Design

# DIAGRAMS





## NOTES

- 1** OPEN UP CIRCULATION AREA/REDUCE CONGESTION
  - Remove Vending Machines.
  - Relocate Check-out, check-in.
  - Mitigate noise from Lobby/Games.
- 2** EXPAND EXISTING KITCHEN, IMPROVE OFFICES
  - Instructional Kitchen.
  - Redesign control counter function.
- 3** CONVERT DANCE STUDIO
  - Multi-purpose program space.
  - Remainder: Instructional kitchen.
- 4** CONVERT APD ROOM FOR TEEN ROOM
- 5** CONVERT TELEVISION ROOM TO COMPUTER ROOM
  - Move TV to wall-mounted location in Lobby/Games.
  - Add door to secure computers.
- 6** NEW DANCE STUDIO
- 7** NEW COURTYARD
  - Paved and shaded.
- 8** ACCESSIBILITY UPGRADES
  - Spot issues as identified by RAS.

# ALTERNATIVE EQUIVALENT COMPLIANCE

Sidewalk along Ainez Drive

Building Placement



Exhibit C











Briefing to the Design Commission

# DOVE SPRINGS RECREATION CENTER

January 25, 2016





## MEMORANDUM

**TO: Chris Johnson, City of Austin DAC**

**DATE: May 21, 2015**

**FROM: John R. King, P.E.**

**RE: Dove Springs Recreation Center Improvements**

**Subchapter E Alternative Equivalent Compliance**

The City of Austin (COA) desires to renovate and expand the existing Dove Springs Recreational Center, based upon the findings and recommendations of the Conceptual Design Study prepared by the Limbacher & Godfrey Architects Project Team. COA Parks & Recreation Department (PAR) has selected Scheme 4 as the preferred basis for the improvements (see Exhibit A). The Dove Springs Recreational Building is located at 5801 Ainez Drive, in Southwest Austin, and is located on a 45.4-acre tract. The original construction of the recreation center was permitted by the COA under Site Development Permit No. SPC-94-0444C, in 1995. The tract is currently zoned as "P-NP" (public use and subject to an adopted neighborhood plan – Southeast Combined Neighborhood Plan). The properties immediately surrounding the tract are currently zoned as "P-NP."

The proposed improvements must comply with the Land Development Code Chapter 25-2 Zoning, Subchapter E design standards. The Subchapter E design requirements are based upon the adjacent roadway classification (Ainez Drive is classified as a "Suburban Roadway"), site zoning (the site is zoned non-residential, i.e. "P-NP"), and size of the site (the site is larger than 5 acres). This memorandum presents proposed requests for **Alternative Equivalent Compliance** to Subchapter E design requirements for a 5-ft clear-zone sidewalk along the Ainez Drive frontage, building placement, and internal circulation routes as follows:

### **Subchapter E, Section 2.2.4 Sidewalks and Building Placement**

1. **Sidewalk along Ainez Drive.** There is an existing sidewalk along the entire Ainez Drive frontage that connects pedestrian and bicycle traffic to the on-site system of hike-bike trails (direct connections to the trails at each end of the property) and to the front entrance of the main entrance. See Exhibit B for the existing sidewalk. Trees/shading along the existing sidewalk is minimal. Section 2.2.4 requires the sidewalk along Ainez Drive to be a 7-ft wide planting zone with a 5-ft wide clear zone sidewalk. As Alternative Equivalent Compliance to this requirement, it is requested that the existing sidewalk remain in its current configuration and shade trees be planted at 30-ft spacing (see Exhibit C for proposed shade tree plantings plan).

2. **Building Placement.** The proposed improvements include an expansion of the existing building footprint. The existing building is at least 260 feet away from the Ainez Drive Right-of-Way (ROW), and it is not feasible or practical to construct the building expansion up to the Ainez Drive sidewalk or ROW. As Alternative Equivalent Compliance to this requirement, it is requested that existing "Connectivity" enhancements be considered (see Subchapter E, Section 2.2.5 section discussion below).

**Subchapter E, Section 2.2.5 Internal Circulation Routes: Sidewalks & Building Placement Requirements for Large Sites**

Since this site is larger than 5 acres, it is classified as a large site. Compliance with Section 2.2.5 is intended to form on-site development of blocks and grids with internal circulation routes, roadways, paths and sidewalks. Since this site is parkland and is not intended to be developed into blocks and grids, Alternative Equivalent Compliance to this requirement is requested in the form of existing “Connectivity” and “Open Space Amenities” enhancements as follows:

- There is an existing inter-connected multi-use system of hike/bike and nature paths on site (i.e. Dove Springs District Park) that connect to the recreation center main building, the athletic fields, the surrounding neighborhood, and to Ainez Drive.
- A section of the hike/bike path is routed through the Williamson Creek nature area riparian and upland woodlands areas.
- The recently constructed Playscape includes the construction of additional nature pathways with nodes of discovery along the pathways.
- There are only three curb cuts along the Ainez Drive ROW: two controlled access points to the hike/bike paths and the recreational center main entrance driveway.
- The Dove Springs District Park land provides substantial natural and undeveloped common open space for public use.
- The new Playscape provides a landscaped area with pedestrian and children amenities.
- The site has a public pavilion for outdoor seating.
- The site has a public swimming pool.
- The site already has a water quality pond, and additional water quality treatment, via a rain garden, will provide water quality treatment for the proposed building expansion. A regional storm water detention pond system provides storm water detention for the site.
- The site has 1 sand volleyball pit, 3 baseball/softball fields, 2 outdoor tennis courts, 1 indoor and 1 outdoor basketball court, 3 soccer fields, and an indoor weight room.

See Exhibit B for a plan view of the existing connectivity and amenities described above.



# SCHEME 4

SEPTEMBER 9, 2015

## Exhibit A



Exhibit B



Exhibit C



**2016 Meeting Schedule for the Design Commission**

The Commission shall meet monthly as specified below. All regular meetings are held on the 4<sup>th</sup> Monday of every month beginning at 6:00 PM in Room 1101, Austin City Hall, Boards and Commissions Room, 301 W. Second Street, Austin, TX 78701, unless specified otherwise.

MEETING DATES*	CANCELLED DATE
January 25, 2016	
February 22, 2016	
March 28, 2016	
April 25, 2016	
May 23, 2016	
June 27, 2016	
July 25, 2016	
August 22, 2016	
September 26, 2016	
October 24, 2016	
November 28, 2016	
December 19, 2016	December 26, 2016

\* All backup materials are due ten (10) days prior to the meeting.

\*\* This meeting may be rescheduled to a different venue.

**Design Commission Executive Liaison:**

Jorge E. Rousselin, CNU-A  
 Development Services Process Coordinator  
 Urban Design, Planning and Zoning Department  
 City of Austin, One Texas Center, 505 Barton Springs Rd., Austin, TX 78704  
 Phone: (512) 974-2975 ■ E-mail: [jorge.rousselin@austintexas.gov](mailto:jorge.rousselin@austintexas.gov)

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# Sustainable Urban Infrastructure

Chicago Department of Transportation

N GLENWOOD AV

Policies and Guidelines

Volume 1



ELSA'S BEAUTY SALON

SPEED LIMIT 20

MANAU

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## OFFICE OF THE MAYOR CITY OF CHICAGO

121 N. LaSalle Street • Chicago, Illinois 60602  
www.cityofchicago.org • @chicagosmayor

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Dear Fellow Chicagoans,

When we released Sustainable Chicago 2015 last year I stated that “A sustainable Chicago is a city that spends less on energy use with each passing year, creates good-paying jobs in up-and-coming industries, responsibly maintains and upgrades its infrastructure, and ensures every Chicagoan has the opportunity to live a healthy and active lifestyle.”

The “Sustainable Urban Infrastructure Guidelines and Policies” fulfills many of those goals. Our city’s commitment to create a sustainable city is more fully realized by implementing this document. It will help create a healthier, more beautiful city, drive the creation of new “green” jobs, and make our infrastructure more resilient.

The Chicago Department of Transportation—along with all of those who participated in creating this document—have helped advance Chicago’s goal of becoming the most sustainable city in the country, and I thank you for your interest, support and commitment to our city. Working together, we make Chicago a great place to live, work, and play.



Rahm Emanuel  
Mayor



Dear Friends,

In 2012, **Chicago Forward** laid out the vision and mission for the Chicago transportation network. It committed to “Ensure that Chicago continues to be a vibrant international city, successfully competing in the global economy with a transportation system that provides high-quality service to residents, businesses and visitors - a system that offers a solid foundation for the city, regional and national economies, yet is sensitive to its communities and environment.” The report shared concrete, measurable goals to achieving that vision. More specifically, in **A More Sustainable City** chapter CDOT committed to continue to be a leader in innovating and demonstrating to the nation the value and viability of building green. I am pleased to present one of the many forward movements to creating a more sustainable city, Chicago’s Sustainable Urban Infrastructure Guidelines and Policies.

The Sustainable Urban Infrastructure Guidelines and Policies encapsulates all of the innovative techniques we have been employing for years and expands to incorporate new elements in our work to further create a sustainable infrastructure for our residents, businesses and visitors. The purpose of the Sustainable Urban Infrastructure Guidelines was to establish an agency and city-wide approach for integrating environmental performance goals into infrastructure design. It focuses on all aspects of our infrastructure including water, energy, materials & waste, placemaking, economics, commissioning, urban ecology, and climate & air quality. These policies are fully aligned and integrated with the complete streets process and comprise a progressive set of guidelines for infrastructure and the public realm. The transportation right-of-way is an essential component for improving environmental conditions as well as mobility and accessibility in Chicago.

Additionally, we have validated through past pilot projects that the use of sustainable practices on projects actually come in under budget and achieve innumerable economic benefits. This holistic approach to urban infrastructure will ensure a sustainable future for Chicago.



Gabe Klein

Commissioner, Department of Transportation

Collaboration within CDOT, numerous City Departments and partner agencies were critical to the successful development of effective design standards. We are thankful to all of our project partners who will transform these policies and guidelines into our urban landscape for decades to come.



# 1.0 INTRODUCTION

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INTRODUCTION

PRIORITIES +  
POLICIES

METHODOLOGY

IMPLEMENTATION

CONCLUSION

## 1.1 PHILOSOPHY



*Solar/Wind Powered Light pole*

### GOALS FOR STREETS AND URBAN INFRASTRUCTURE

The urban form, with its density, public transit, and walkable neighborhoods, is a sustainable way for humans to live. Therefore, how to design and maintain a city is critical to creating a sustainable ecosystem—one that provides not only for today’s needs but for the needs of future generations, and one that takes not only humans into account but all life. To achieve this goal, cities must end the “business as usual” approach and become caretakers for both the people they serve and the environment in which they live.

The City of Chicago is working toward this goal on many fronts. One of the most important, however, is rethinking how to plan, design, build, and maintain its public right-of-way, which represents 23 percent of its land area and more than 70 percent of its public open space. Comprising more than 4,000 miles of streets and 2,100 miles of alleys, these mostly paved surfaces contribute significantly to environmental challenges, including stormwater management, water use, urban heat island effect, energy use, and waste management.

The City of Chicago has earned national recognition for its forward-thinking commitment to urban environmental sustainability. Federal, state, and municipal decision makers look to Chicago’s leadership on such issues as green roofs, green-building permitting, green alleys, sustainable streets, bicycle and public transportation planning, park and open space development, and urban wildlife habitat preservation. These guidelines build on these earlier and ongoing efforts and capture the lessons learned from hundreds of green-infrastructure pilot projects that have been installed throughout the city, as well as national best practice. They outline how green infrastructure can be fully integrated into all aspects of the public right-of-way to enrich the urban fabric and create resiliency. These guidelines establish more than 80 requirements, standards, and policies to help ensure Chicago’s progressive solutions to environmental issues and its commitment to improving quality of life are integrated across the full spectrum of projects and regulatory responsibilities performed by the Chicago Department of Transportation (CDOT) and those that work in the public right-of-way.

This document supports and builds on citywide environmental plans, including the Chicago Climate Action Plan that was released in September 2008 and the recently released Sustainable Chicago 2015 Plan. This document is an action item in CDOT's Chicago Forward Action Agenda, and it works in concert with other CDOT documents—including the Complete Streets Chicago guidelines and forthcoming placemaking guidelines—to define a process and clear guidance to ensure great streets and transportation infrastructure. Furthermore, this document is supported by many program-specific plans (e.g., the Streets for Cycling Plan 2020 and Chicago Pedestrian Plan) and technical manuals (e.g., the Street Design Guidelines). Together these documents not only create safe and livable streets, they help ensure the greatest financial, social, and environmental return on investment to the city.

### MISSION, PURPOSE AND NEED

It is with all of this in mind that the mission statement for this document was developed.

The Sustainable Urban Infrastructure Guidelines and Policies will embrace and expand upon the environmental benefits of Complete Streets and Placemaking guidelines to help create and maintain a city where all Chicagoans benefit from a high quality of life without depleting our natural resources.

This mission statement is further supported by three purpose and need statements, which express the high-level outcomes and goals of the principles, objectives, requirements and processes outlined in the following chapters.

- To create a safe, livable, and sustainable city with great streets and healthy places.
- To provide simple, pointed design, construction, and maintenance guidance for the creation of a sustainable urban infrastructure for all Chicagoans.
- To prepare the city's infrastructure to respond to the challenges of climate change and enact policies to reduce its negative impacts.



*Sangamon Paseo*

**CORE VALUES**



*Wabash Avenue*



*Michigan Avenue*



*Street Fest*

**The Public Right-of-Way is Public Space:**

By understanding that the public right-of-way is public space, we understand why it is critical that the right-of-way is planned, designed, built, and maintained for all Chicagoans. Public space is a valuable asset that is held in trust for the people. Consequently, it is critical that the greatest value be derived from every dollar invested in its construction and upkeep. Sustainable infrastructure is not only good for the environment, it is a good investment. Sustainable infrastructure achieves this goal because it is designed to address social, environmental, as well as economic performance.

**Streets For People**

As stated in Complete Streets Chicago, streets should be designed to optimize pedestrian mobility for all types of users, especially the most vulnerable. When this is done successfully, people can safely and enjoyably stroll, bike, take transit, or drive. Streets must also be designed as places—places where people want to live, work, and play—that celebrate our city’s diversity, culture, and unique neighborhoods. Streets for people are designed in collaboration with communities to create a sustainable and beautiful city.

**Healthy Places**

The design of the city’s infrastructure can help reinforce our health and the health of our environment. Reducing the use of fossil fuels and introducing innovative materials and landscaping leads to cleaner air and better, safer facilities for walking, bicycling, and all forms of active transportation. All these activities directly link to improving individual health as well as creating a healthy ecosystem. Furthermore, “healthy places” create a healthy region by reducing combined sewer overflows and creating cleaner air and stronger regional economies.

**Climate Resilience**

To create infrastructure that functions under changing climactic conditions, Chicago has been leading the way on greenhouse gas mitigation and adaptation strategies, and continues to focus on reinforcing and reconceiving its civic facilities to cope with long-term trends and unexpected shocks. Climate resilience is embedded in the design philosophy of this document and is fundamental to creating sustainable infrastructure. Resilience reduces maintenance costs and liability over the lifetime of the infrastructure improvement.

### THREE PARTS TO GREAT STREETS

Key to understanding the mission of this document is to understand its role and relationship to the Complete Streets and Placemaking guidelines. Together, these three documents define the key principles that CDOT believes create great streets and infrastructure. It is through the integration and careful balance of modal hierarchy, ecological services, and placemaking with good planning, design, construction, and maintenance that each individual project adds up to make a great city and provides the greatest environmental and social benefits at the least cost and with the best return on investment.



## RETURN ON SUSTAINABLE INVESTMENT

The philosophy of this document is that while there are cost implications to some of the requirements—such as increased staff time in review and documentation, modest design fee increases while consultants adjust to new standards, and potential modest construction fee increases as the entire industry adopts and adapts to revised practice—the value of the increased investment reflected in these costs justifies the expenditure. Furthermore, many of the requirements lead to cost savings. The use of recycled materials, recycling construction waste, using energy efficient lighting, and reducing “grey” or “pipe” stormwater solutions are just a few of the examples that have been shown to reduce both capital and long term costs. For example, the successful construction bid for the Pilsen Sustainable Street Project was 21% less per block than the average per block cost of the 10 other similar projects bid that year. Soft costs can also be reduced by “adapting” our infrastructure to climate change. For example, street flooding can be eliminated or greatly reduced with stormwater best management practices. This reduces homeowner and business insurance claims, protects roadway infrastructure, maintains walkable and cycle-able sidewalks and streets, and reduces interruptions to economic activity.

This document took a particular look at the full cost and benefit of environmental best practices on CDOT pilot projects, which is often referred to as a sustainability valuation, sustainable return on investment, or calculation of the triple bottom line. In a fiscal reality where agencies must do more with less, investing in projects that deliver multiple benefits is the smartest approach. It is important to get the most out of every dollar invested. So when that dollar buys not just a physical project that enables mobility but also slows stormwater to reduce overflow events, improves air quality, reduces ambient temperatures for surrounding buildings, reduces energy use, and creates places where people want to live, we are making wise choices for the city’s economy and future.

“Implementation of the Green Alleys program saw the cost of permeable concrete drop by 47% between original pilot alley installation and the term contract prices the very next year when it was made a program.”





The results of the cost-benefit analysis carried out on CDOT's Pilsen Sustainable Street Project—an analysis that includes valuing the cost and benefits of ecological services and measurable quality of life improvements—helps communicate the full value of the investment to public and private stakeholders. This information assists CDOT and its partnering agencies as they make investment decisions through an understanding of how permeable pavement choices, infiltration planters, recycled content, plantings and placemaking elements comparatively pay back over time. The analysis also had a life-cycle cost component that included recurring maintenance and operations costs as well as disposal or replacement costs.

The Chicago region has several leaders integrating life-cycle cost analysis and environmental life-cycle assessment in decision making for infrastructure projects. The Illinois Tollway Authority has been using a framework life-cycle assessment tool to analyze various pavement choices. This means that several environmental characteristics of the material, including the impacts of extraction, processing, transportation, maintenance and disposal, are assessed and balanced to provide a score for the material. The result, ideally, is material that provides high-quality performance and has no negative cumulative impacts.

CDOT has also found that partnering with other departments and agencies enables better outcomes at lower costs. Information sharing is a hallmark of partnerships, increasing the understanding across city agencies and departments of which practices lead to the best outcomes with lower life-cycle costs. This also means that when it comes time to make citywide decisions on commodities contracts, there is greater confidence in asking for and obtaining more competitive prices for innovative materials such as recycled aggregates and porous asphalt. In addition, partnerships across agencies and departments result in standardized requirements that drive market change. For example, when every agency requires recycled content or clean fleets, contractors and suppliers respond, making the investments necessary to compete in the Chicago infrastructure market. Implementation of the Green Alleys program saw the cost of porous concrete drop by 47 percent between original pilot alley installation and the term contract prices received the very next year when it was made into a program.

These partnerships also include working with non-governmental organizations, educational and research institutions to carry out commissioning of projects. Partnering with these organizations helps spread the wealth of knowledge gained from one project to many, throughout the region.

## ACHIEVING CHICAGO AND ITS REGION'S SUSTAINABILITY PRIORITIES

The Chicago region has been on the cutting edge of sustainable infrastructure implementation through both integrated planning and project-specific mitigation. The regional and city sustainability plans form a framework for the Sustainable Urban Infrastructure Guidelines and Policies. They set the regional goals and citywide metrics that inform this documents specific performance metrics.

Strong leadership has been demonstrated through the GO TO 2040 plan—the long-range comprehensive plan for the Chicago region that includes Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will Counties. This plan was guided and endorsed by stakeholder representatives from federal, state, county, and city governments, as well as regional transportation agencies, railroad companies, and private business. GO TO 2040 demonstrates a clear need for environmental mitigation and provides regional goals to preserve and enrich our water, energy, and open space resources.



**The Chicago Climate Action Plan** To assess the impacts of climate change and to develop a plan for the future, the City of Chicago consulted leading scientists to describe various scenarios for Chicago's climate future and how those would affect life in the city. Chicago needs to achieve an 80 percent reduction below its 1990 greenhouse gas (GHG) emissions level by the year 2050 to do its part in avoiding the worst global impacts of climate change. Improved transportation options are one of the four GHG emissions mitigation strategies identified in the Chicago Climate Action Plan (CCAP), which estimates that 21 percent of the city's GHG emissions are produced by cars, trucks, buses, and trains. A broad set of organizations provided input throughout the CCAP transportation planning process, representing government agencies, private businesses, and non-profit stakeholders. Through this data-intensive and collaborative process, a portfolio of approximately 120 transportation ideas were generated to guide adaptation and mitigation efforts toward meeting the aggressive carbon reduction goals.



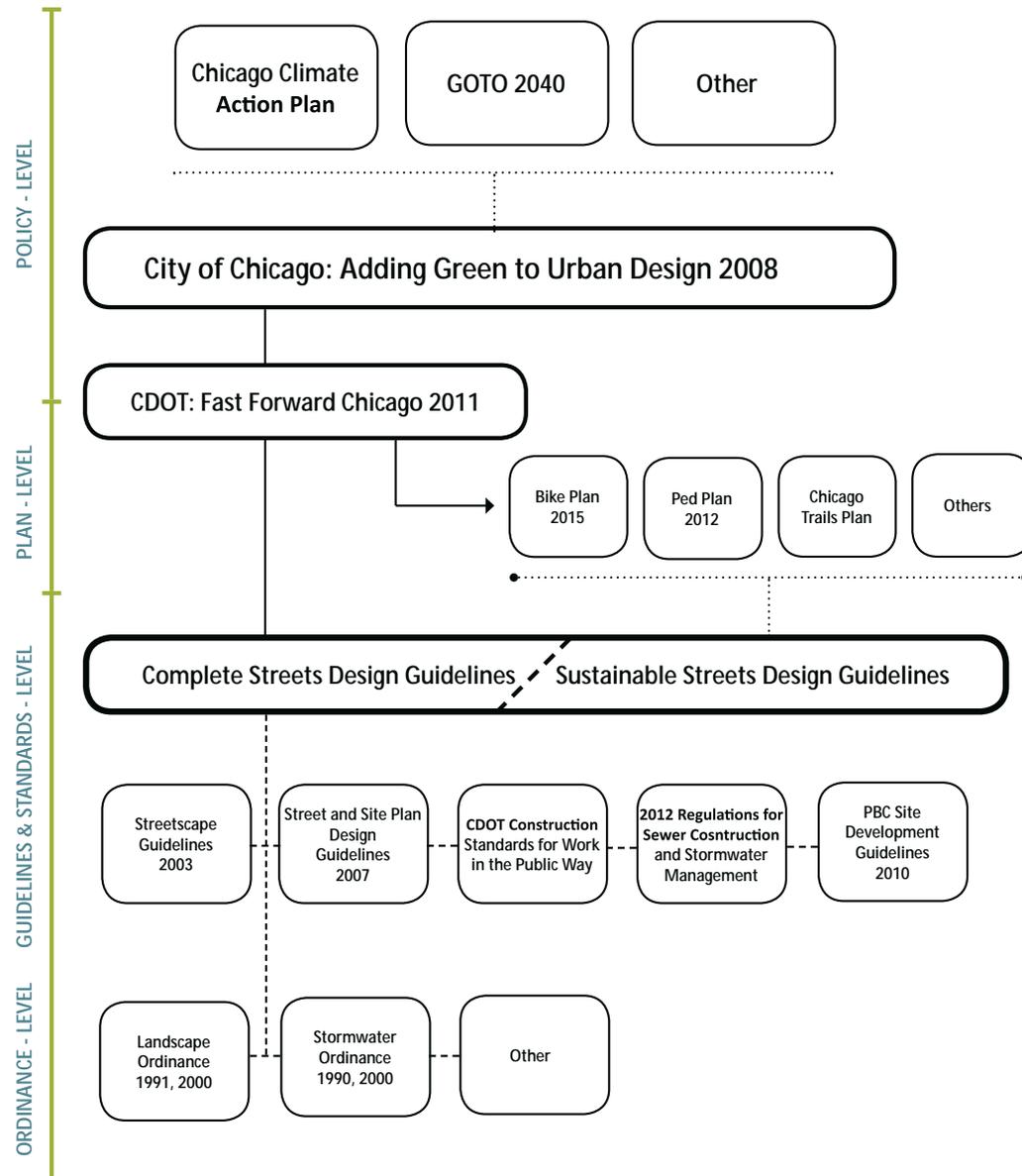
### Green Infrastructure Vision

Communities, land-use planners, and conservation professionals use the Chicago Wilderness Green Infrastructure Vision (GIV) to inform their land-use planning. The GIV identifies 1.8 million acres that can be restored, protected, or connected through conservation and thoughtful, sustainable development practices. The GIV guides the protection and development of an accessible, interconnected network of healthy ecosystems that contribute to economic vitality and quality of life for all the region's residents. Chicago Wilderness members and communities implement the GIV at four scales: regional, community, neighborhood, and site.



**Sustainable Chicago 2015** The City of Chicago recently completed Sustainable Chicago 2015: Meeting the Challenge of the 21st Century. Sustainable Chicago 2015 is a sustainability roadmap that guides Chicago residents and businesses in laying out realistic and attainable steps to achieve a positive future. The plan offers a set of 24 goals and initiatives spanning seven categories that should be completed in the next three years. Several of these goals are specifically addressed through requirements detailed in the guidelines; several key actions directly correspond with the requirements and policies in these guidelines.

As well as resting within the regional and city policy and ecological framework, the Sustainable Urban Infrastructure Guidelines and Policies are part of a growing library of innovative design guidelines, manuals, handbooks, and lessons learned from various pilot projects for CDOT, described next and illustrated schematically:



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## PILOTS TO PROGRAMS

The City of Chicago has played an active role in project-specific mitigation efforts including the award winning Green Alley program and Sustainable Streets program, that transformed the success of pilot projects into an effective program. Projects within these programs are redefining infrastructure in an urban environment by integrating Complete Streets and sustainable design best practices to achieve increased environmental performance from investments in transportation infrastructure.

This section presents successful projects from that program, featuring the environmental elements.

### Pilsen Sustainable Street Project

The City of Chicago's commitment to ecological principles is demonstrated through the Pilsen Sustainable Street Project which, funded in part through the Federal Highway Administration's (FHWA) Eco-Logical Program, has received quantifiable results by setting aggressive sustainability goals in eight performance areas such as stormwater management, material reuse, energy reduction, and placemaking. The project demonstrates a full range of sustainable design techniques that improve the urban ecosystem, promote economic development, increase the safety and usability of streets for all users, and build healthy communities. It demonstrates both mitigation and adaptation strategies by reducing its carbon footprint and integrating technologies that allow the infrastructure to address and adapt to climate change.

This recently completed project consisted of streetscape improvements for Cermak Road (22nd Street) and Blue Island Avenue. Located on Cermak Road between Halsted Street and Ashland Avenue, and Blue Island Avenue between Ashland Avenue and Wolcott Avenue, this 1.5-mile long pilot project demonstrates a full range of sustainable design techniques that improve the urban ecosystem, promote economic development, increase the safety and usability of streets for all users, and build healthy communities. This project represents the first time a comprehensive set of environmental performance goals have been integrated into a Chicago roadway project. It creates a new paradigm for infrastructure in the 21st century and helps to demonstrate how a quarter of the city's land area and infrastructure can be revitalized to address ongoing environmental issues while improving performance.



## Sustainability Highlights include:

- Environmental goals:
  - Recycled Content: The project sought to recycle at least 90 percent of construction waste based on LEED for New Construction criteria. In addition, the project required that a minimum of 10 percent of the total materials value should be from post-consumer recycled content.
  - Energy Efficiency: The project sought to reduce energy use by a minimum of 40 percent below a typical streetscape baseline and required the use of reflective surfaces on roads/sidewalks and dark sky-friendly fixtures. To minimize transportation energy, a minimum of 40 percent of total materials was required to be extracted, harvested, recovered, and/or manufactured within 500 miles of the project site.
  - Stormwater Management: The project sought to divert 80 percent of the typical average annual rainfall and at least 2/3 of rainwater falling within the catchment area into stormwater best management practices.
  - Urban Heat Island Mitigation: The project sought to reduce ambient summer temperatures on streets and sidewalks through the use of high albedo pavements, roadway coatings, landscaping, and permeable pavements. The use of ultra-low sulfur diesel and the enforcement of the city's anti-idling policy were required.
  - Active and Public Transportation: The project improved bus stops with signage, shelters and lighting and, where possible, promoted cycling with a new bike lane and improved pedestrian mobility with accessible sidewalks, reduced crossing distances, and a pedestrian refuge island.
  - Water Efficiency: The project required the elimination of potable water for irrigation and specified native or climate-adapted drought-tolerant plants for all landscape material. It used harvested rain water to create a stormwater feature in a public plaza.
  - Education: The project provided public outreach materials and a self-guided tour brochure to highlight innovative, sustainable design features of the streetscape. The project helped create two new plazas that celebrate community, provide gathering space, and allow for interaction and observation of people and the natural world.
  - Monitoring: The project was required to model stormwater best management practices (BMPs) in Infoworks to analyze results and refine the design. In addition, stormwater BMPs were monitored to ensure predicted performance and determine maintenance practices.





- **Technology Innovation:** Use of photocatalytic cement to help maintain a high albedo and improve air quality by filtering out smog-precursor particles.
- **Process Innovation:** One process innovation included incorporating environmental and social goals into the project early in design, as well as modeling stormwater BMPs using Department of Water Management resource management software.
- **Market Change:** New markets were developed through area suppliers, including concrete with 30 percent recycled content, permeable pavers with a smog-eating photocatalytic cement surface, and asphalt with reclaimed asphalt shingles, ground tire rubber, slag, and reclaimed pavements made using warm-mix technology. While these products were developed for this project, they were quickly integrated into the manufacturer's product lines, developing whole new markets.
- **How It Creates Jobs:** By introducing new products and services into the construction market, this project reinforced green construction jobs. In addition, the Political Economy Research Institute has found that pedestrian and bicycling infrastructure, such as that installed in the Pilsen Sustainable Street Project, creates 11.4 jobs for every \$1 million invested—46 percent more than car-only road projects.
- **Return On Investment:** The results of the sustainable return on investment analysis carried out for Cermak/Blue Island have shown that for every dollar spent, there was more than a dollar returned to the Chicago economy. The bids for the project came in under the anticipated cost and 21 percent less per block than the average cost of the 10 other similar projects bid at the same time, signaling some market readiness for integrating innovative sustainability practices into business as usual, and their ability to save upfront capital costs as well as long term life cycle costs.

## 130th St. and Torrence Avenue Realignment and Grade Separation

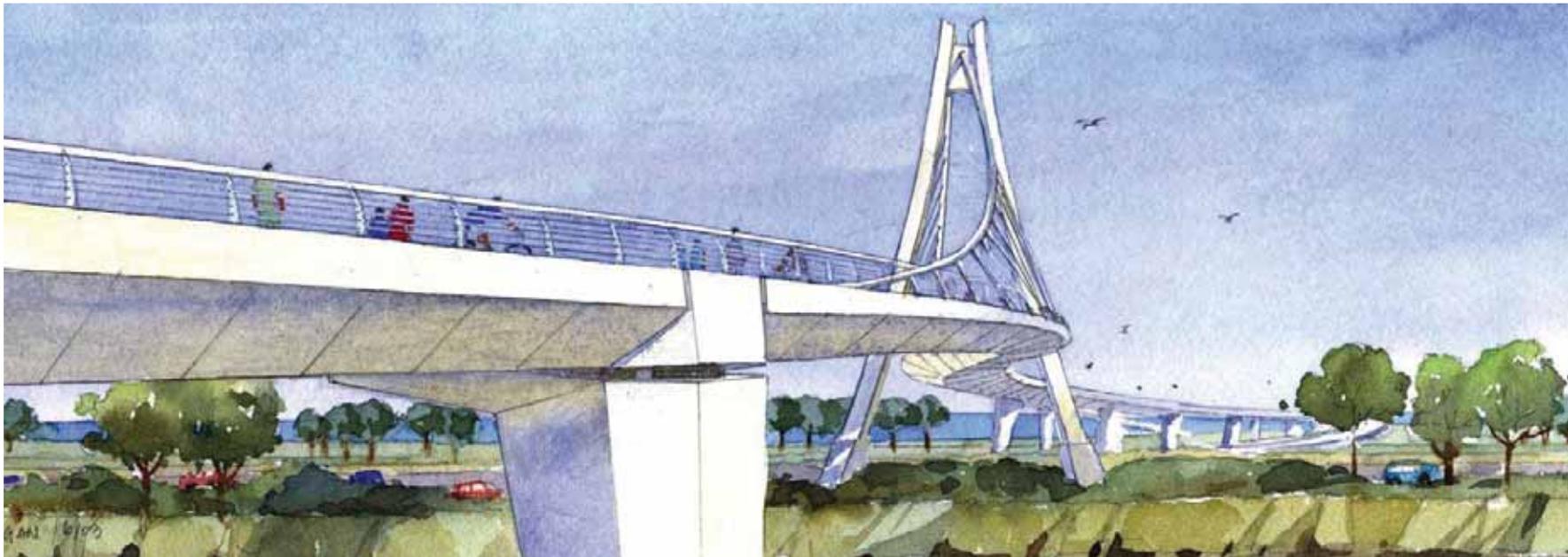
### Sustainability Highlights include:

- Treatment of stormwater in a self-sustained vegetated treatment pond, where the sediment and debris are trapped in the pond and clean water is then slowly discharged through a bio-swale into the Calumet River. Previous conditions had stormwater directly discharging into the river.
- Replacement of concrete medians with landscaped medians in addition to several other areas where pavement was replaced with understory landscaping and trees, thereby increasing the green space and the number of trees in the project.
- The 9,000 feet of retaining walls have vines growing along them, increasing the volume of vegetation in the project.
- The two grade-separations substantially reduce vehicle idle time, resulting in substantial reduction in emissions and time savings for travelers.
- The realigned streets reduce the number of traffic signals and allow the traffic to flow more smoothly, resulting in air quality emissions reductions.
- All the new traffic signals use LEDs, substantially saving energy.



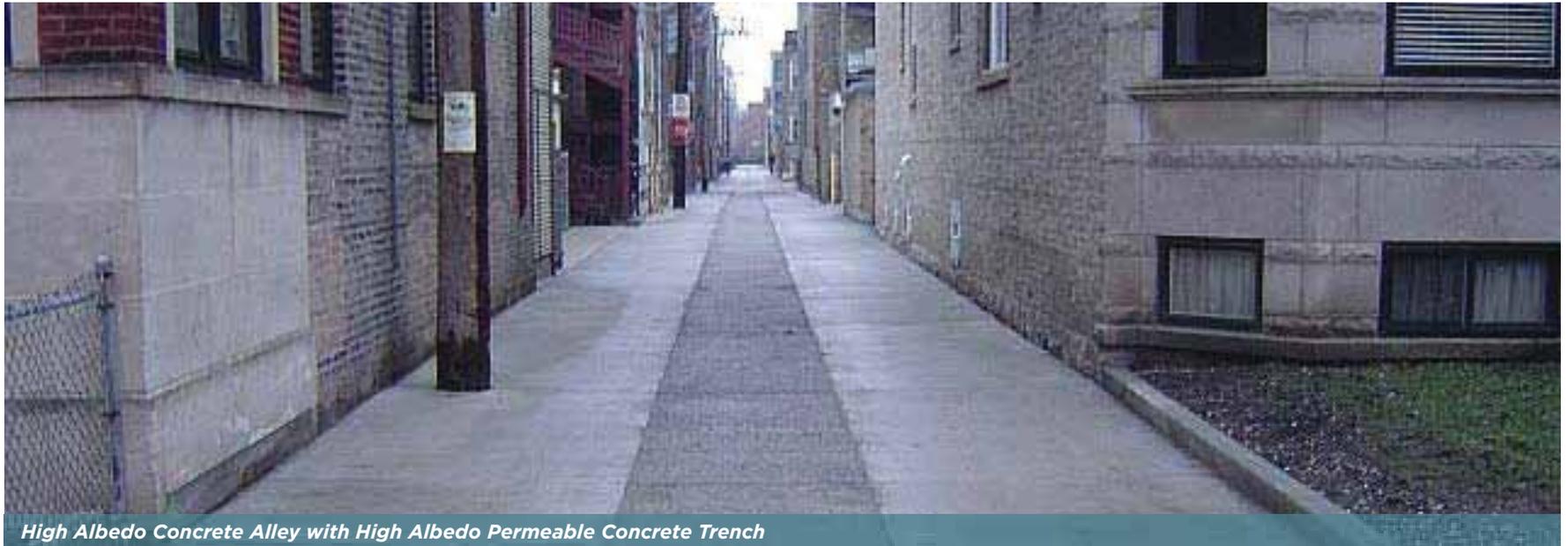
## Pedestrian Bridge at 35th Street

A new pedestrian bridge will be constructed at 35th Street over Lake Shore Drive and rail lines. This will provide a more accessible and pedestrian friendly connection to the park for the neighborhood. The existing truss bridge and deteriorating access will be replaced with a cable stay structure, and will tie into a new streetscape in the neighborhood. The streetscape will facilitate pedestrian and cycling access and will also include infiltration planters and rain gardens. As it is constructed, the project will be able to remove and recycle existing asphalt, and incorporate new vegetation and trees, improving stormwater management.



## Green Alleys

Many of the innovations in permeable and cool pavement as well as lighting requirements piloted in the Green Alleys' program and documented in the Green Alleys' handbook have been incorporated into the Sustainable Urban Infrastructure guidelines.



### Sustainability Highlights include:

- **Environmental Goals:** Infiltrate stormwater to minimize basement flooding; reduce light pollution; increase recycled content in pavement materials; and employ cool pavement strategies to minimize the urban heat island effect.
- **Technology Innovation:** Create porous concrete and asphalt with ground tire rubber.
- **Process Innovation:** Monitor and work with maintenance crews to develop maintenance protocols to achieve long-term performance and work with contractors to develop installation methods.
- **Market Change:** Create new market for permeable pavements that previously did not exist; expand the use of recycled aggregates, slag and ground tire rubber; and help drive contractor training, leading to competitive pricing of permeable solutions and a trained vendor pool.
- **How It Creates Jobs:** Create new product markets such as new divisions oriented around permeable pavements; create new contractor specialties; increase demand for recycling market; spur innovation in pavement design leading to the birth of several “green” mix designs across several agencies.
- **Return On Investment:** Reduce basement flooding, minimizing private spending on clean up and damage; eliminate alley flooding, increasing roadway function and life span, thereby reducing life-cycle costs; reduce or make cost neutral first costs by eliminating or greatly reducing the amount of sewer infrastructure.



*Permeable Asphalt Alley*

## 1.2 DOCUMENT DEVELOPMENT

### HOW TO NAVIGATE THE DOCUMENT

This document is composed of two distinct parts: Volume 1 and Volume 2.

Volume 1 lays out an understanding of how Chicago's infrastructure serves multiple objectives. At the highest level, it explains the context of Chicago's infrastructure, provides explicit sustainability goals, how the effort works in harmony with other city efforts, and how to pull sustainable ideas together into a coherent, effective project. Volume 1 details the categories of sustainability issues infrastructure can address, the prioritized objectives projects should work to achieve, and requirements that set a baseline for advancing each type of infrastructure project. Volume 1 lays out the implementation of these new requirements, and explains the matrices and worksheets that guide project managers through the selection of the requirements that are appropriate for their project. It also describes the advances of policies that are necessary to fully implement sustainable infrastructure, and illustrates how different strategies come together, complementing one another.

Volume 2 comprises specific strategies, references, and resources that are identified to help project managers, resident engineers, and interested parties accomplish the set of requirements detailed in Volume 1. Volume 2 also contains implementation matrices that lay out activities other agencies will carry out. Volume 2 will require yearly review and is subject to revision as best practices are revised and refined.

### WHO IS THE AUDIENCE?

This document is intended to be a reference for anyone in the city and the region interested in advancing the design and performance of their infrastructure investments, but is specifically directed to CDOT, with the goal of integrating sustainable best practices and ecological services into all of its capital projects and maintenance efforts. It is also directed at other agencies, utilities, and departments carrying out infrastructure work in the public way. Particular audiences in mind during its development include the following:

- CDOT staff
- Consultants
- Other city infrastructure departments
- Chicago sister agencies
- Utilities
- Federal / state / county transportation departments and agencies
- Private developers
- City officials
- City residents

### COORDINATION

Implementation of this document requires new and enriched coordination among divisions and sections of CDOT, as well as between sister agencies and other city, regional, state, and federal infrastructure departments and agencies. Sustainable urban infrastructure requires that systems think and look for synergies both between various stakeholders and within a project.

## HOW WILL CDOT MEASURE PROGRESS?

Keeping track of innovation, collaboration, and development of best practice; incorporating new practices into projects; including contract language concerning new practices; executing new practices in design and construction; and revising maintenance practices requires a tracking mechanism. This document suggests two checklists for CDOT managers:

- A checklist to document the consideration of sustainable urban infrastructure categories and objectives.
- A whole-life project checklist that moves with the project from planning and Request for Proposal (RFP) development, through design, construction, and maintenance.

In addition, this document sets performance metrics for each strategy to allow for consistent benchmarks and ease of data collection. In turn, these metrics feed into the city's larger sustainable goals set forth in Sustainable Chicago 2015 and the Chicago Climate Action Plan.

It also recommends a series of ongoing committees to track new best practices, further develop and refine implementation processes, determine ways to track and maintain data, and ensure policy implementation.

## HOW DOES ENVIRONMENTAL DATA DRIVE THIS PROCESS?

Civil engineering and urban design incorporates information into project conception and design. Part of the purpose of this document is to illustrate how and when types of environmental data should inform and enhance the planning, design, construction, and maintenance of projects. This document considers how managers obtain and use soil, climate, land use, and other data and mapping to best inform project design. In addition, this document emphasizes enhancing ongoing and creating new data sets through feedback from design, construction, commissioning, and maintenance.

## HOW WAS THIS DOCUMENT DEVELOPED?

This document was produced through workshops and discussions with CDOT project managers and City of Chicago agencies as well as representatives from outside agencies, non-profits, industry, and community groups who met as a task force, or who participated as part of a group of stakeholders or at public meetings and industry presentations.

Best practices from various sustainable rating systems, similar documents from peer cities, and knowledge gleaned from CDOT's own innovative pilot projects was assimilated



*Infiltration Test in Cermak Planter*

into a 5-year implementation plan to fully incorporate sustainable best practices into all aspects of planning, design, construction, and maintenance of transportation infrastructure projects and work in the public right-of-way. It reflects and captures the current state of practice to establish a benchmark for all projects to implement in 2013 and to be improved upon over the next 5 years, with specific goals for 2015 and 2018. In addition, it presents policies that will further enhance sustainability but that will need time and more research to effectively implement.

## PROCESS ROLL-OUT

The requirements and policies will be implemented over a 5-year horizon. They will evolve, turning policies into initiatives and increasing the intensity of the requirements. The following is the 5-year plan to implement these ideas and gradually evolve “business as usual”:

### 2013-2014

- Roll-out implementation
- Incorporate requirements into all new RFPs
- Review case studies of applications and performance data
- Refine requirements based on pilot applications to CDOT projects
- Pilot sustainability valuation and apply lessons learned
- Institute committees to ensure implementation and continue to refine and define process, performance metrics, specifications, detail data, and RFP language

### 2015

- Apply refined requirements, or intensify requirements
- Achieve mid-term policy goals
- Apply sustainability valuation for major projects
- Incorporate findings from committees as appropriate
- Review type and role of committees to determine if changes need to be made

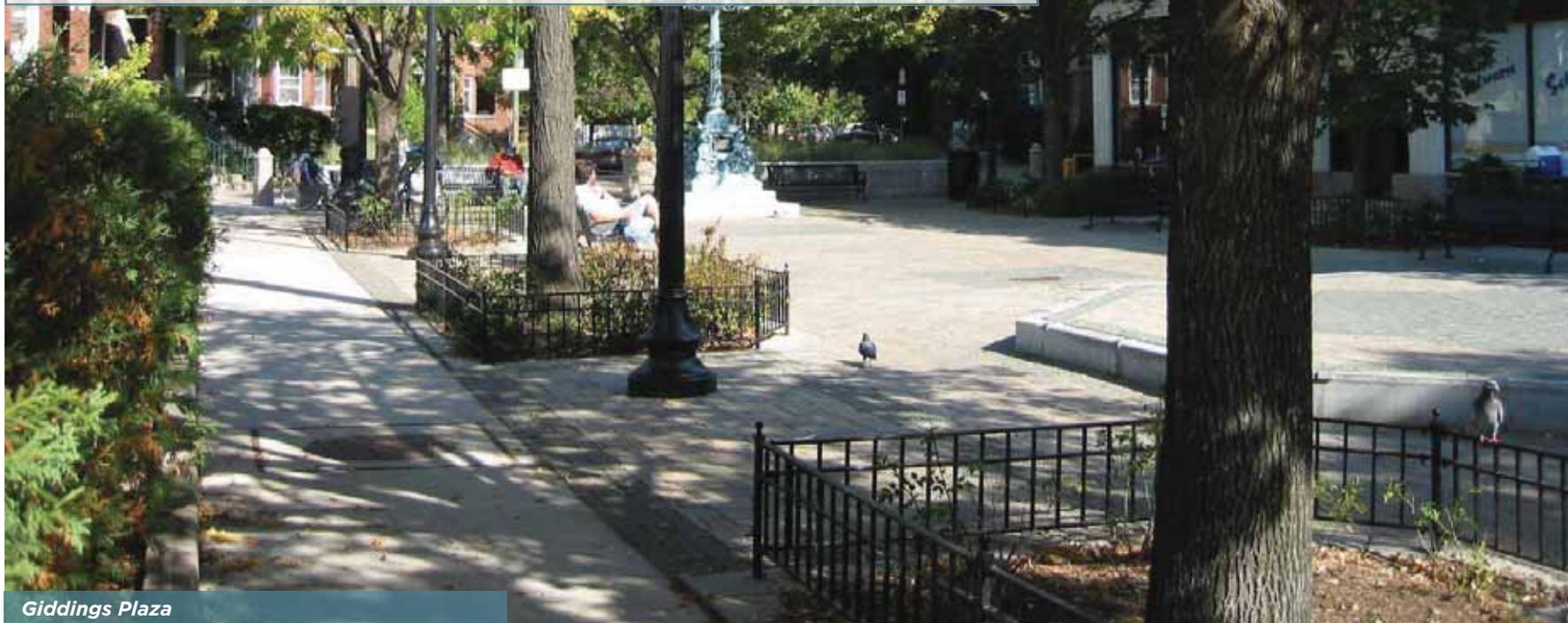
### 2018

- Apply refined requirements
- Intensify appropriate requirements
- Achieve longer-term policy goals
- Review requirements and policies to determine ongoing viability or need for improvement and new initiatives
- Develop new policies as appropriate for next 5-year horizon
- Investigate the need to publish new edition

The Sustainable Urban Infrastructure Guidelines and Policies are a tool to advance CDOT project implementation using cutting-edge sustainable practices. It also helps to fulfill citywide environmental planning goals, and will be used by CDOT to track the future environmental performance of the public right-of-way.

It is both a policy document that explains the overarching philosophy and high-level policy goals, and an implementation tool that involves business as usual.

While these requirements and policies may look strikingly aggressive, they are often codifying principles that are effective and feasible through exemplary pilot projects or that represent the logical next step. They also attempt to encapsulate principles that may have received extensive discussion for years but have never been written down as policy.



*Giddings Plaza*



# 2.0 PRIORITIES + POLICIES

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	Categories and Objectives	
	Requirements	
	<b>W</b> Water	
	<b>EN</b> Energy	
	<b>EC</b> Economics	
	<b>MW</b> Materials + Waste	
	<b>CA</b> Climate + Air Quality	
	<b>BC</b> Beauty + Community	
	<b>UE</b> Urban Ecology	
	<b>CM</b> Commissioning	

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## 2.1 SUSTAINABLE INFRASTRUCTURE PERFORMANCE STANDARDS

### Why not a rating system?

An important first step in developing the Sustainable Urban Infrastructure Guidelines and Policies involved the review of state, national, and international best practices in the area of sustainability assessment or rating systems. Rating systems provide useful benchmarks to express industry standards of what constitutes a sustainable project and help establish standards for quantifying benefits; when appropriate, this document incorporates best practices that have arisen from these systems.

Current rating systems range from roadway-specific to encompassing all aspects of infrastructure projects (from site design to building focused). They outline requirements with a number of optional points to obtain an overall environmental “score” for the project. Many rating systems for infrastructure are still emerging, and while they help communicate what has occurred on a project and its success, this is true only if the value of the rating system is clear and established to a broad audience. Furthermore, these rating systems often require specific training and self-direction on the part of the project team to successfully implement and are not tailored to unique local conditions and regional climates.

To counter some of the limitations of rating systems, cities throughout the U.S. have adopted guidelines and requirements for infrastructure that reflect their specific environmental and social circumstances. This approach takes some of the guesswork out of what targets a project should aim toward, and can enable clearer signals to consulting engineers, contractors, and materials producers and suppliers. These guidelines and requirements take advantage of leadership stemming from successful Chicago pilot projects and spread success and best practices throughout CDOT’s projects, as well as to other agencies and city departments. The City of Chicago may elect to have projects meet a specific rating system at some future point, as there is nothing in this document that precludes the use of any rating system. Rather, it refines a range of systems to the specific needs of the city and the region.

For the purposes of this document, CDOT’s objectives focused on transportation infrastructure, not just roads—a 5-year plan to quickly and meaningfully ramp up efforts to focus on where CDOT started (specific to the city’s and region’s unique environmental issues), to tailor CDOT project types and other’s doing work in the public way, and to provide specific guidance to project managers and other implementers.



## Range of Projects and Implementation Mechanisms

These guidelines apply to small- and large-scale projects so that every project that CDOT carries out can achieve a relevant sustainability impact. The method to winnow the entire set of requirements down to a given project is detailed in the implementation section. The application of requirements to projects was reviewed and refined by the task force.

### Prescriptive or Performance?

These guidelines contain both prescriptive and performance requirements because CDOT engages in a range of routine infrastructure rehabilitation and maintenance, competitively bid projects, and standing term contracts. For projects where a range of circumstances affect design, performance criteria enable designers to work creatively toward solutions. For standard projects, where CDOT applies a consistent specification or construction methodology, prescriptive requirements provide clarity to project designers and the construction market.



## 2.2 ENVIRONMENTAL CATEGORIES, OBJECTIVES, REQUIREMENTS, ORGANIZATION

The design of Chicago's right-of-way has a significant impact on the livability of the city as well as the health, safety, and welfare of its citizens. The public right-of-way, which mostly comprises streets and alleys, is a large part of the public realm and provides substantial open space, including view corridors and green space. This chapter contains a collection of sustainability priority categories, or themes, that apply to infrastructure planning, design, and construction, and points the way for new policies.

The categories, objectives, and requirements detailed in this section provide the user with sustainability options where they are not precluded by regulation and steer the user toward selections of practices that have the optimal sustainability impacts for the type of project and the region. They organize ecological services around transportation infrastructure and provide clear direction on what sustainable objectives are to be addressed, and specific requirements and policies to be implemented.



## CATEGORIES

The categories are environmental themes that are fundamental to CDOT's understanding of sustainable urban infrastructure and street design. These categories were developed through a review of national and international best practices and CDOT's own experience. This collection was then filtered through an understanding of the specific needs and vision for Chicago, and the role of this document as part of a tri-partite with complete streets and placemaking guidelines. The resulting eight categories are the broad initiatives that organize the specific environmental objectives of CDOT and the city, as well as form the organizational backbone of this document

## OBJECTIVES

The objectives reflect the environmental imperatives and social and economic priorities of each category. They are prioritized based on Chicago regional and city-specific context. They are the goals and purpose of the requirements and policies. Objectives help a project manager think through what is important in their specific project context. As a prioritized list, they direct a project manager to select solutions and strategies that achieve multiple objectives and result in the most impact.

## REQUIREMENTS AND POLICIES

The requirements and policies are at the heart of this document and provide the road map to achieve the objectives and environmental benchmarks identified by CDOT and the city as a whole. These requirements take the objectives and link them with a specific, project-level actions or policies. Requirements provide an exact direction for the project manager to follow and are specific to different types of infrastructure projects. Not all requirements apply to all projects. This is made clear in the requirement matrices (Section 4), one for each category, which lists the different projects types and the requirements and policies that apply.

The policies themselves play a special role: They represent sustainability initiatives that do not necessarily require a specific metric, or an idea that requires further investigation before a requirement can be developed. The policies are a road map for innovation. Finally, both the policies and requirements are organized around a 5-year horizon with early adoption in 2013, with many initiatives ramping up or coming online in 2015 and 2018

## STRATEGIES AND BEST PRACTICES

The selected strategies help project teams think through and select methods, calculations, and procedures to achieve the requirements. The strategies demonstrate various ways to implement the requirements and achieve the objectives. They highlight the synergies between objectives and provide design considerations, best practices, and references. They also set specific performance metrics for each strategy as appropriate. They are located in Volume 2 to allow them to be updated independently and periodically.

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## CATEGORIES

CATEGORIES	OBJECTIVES
Water <b>W</b>	<ol style="list-style-type: none"> <li>1. Reduce basement and street flooding</li> <li>2. Reduce combined sewer overflow (CSO) events and volumes</li> <li>3. Reduce potable water use</li> <li>4. Clean and direct stormwater to natural water bodies</li> <li>5. Reduce non-point source pollution to natural water bodies</li> <li>6. Ensure erosion and sediment control</li> </ol>
Energy <b>EN</b>	<ol style="list-style-type: none"> <li>1. Reduce energy use</li> <li>2. Use clean and renewable energy</li> <li>3. Use the public right-of-way to generate and transmit renewable energy</li> </ol>
Economics <b>EC</b>	<ol style="list-style-type: none"> <li>1. Quantify the environmental value of infrastructure investment</li> <li>2. Coordinate capital improvements with other city departments and agencies to maximize environmental benefits</li> <li>3. Streamline utility coordination and installation to minimize environmental impact</li> <li>4. Maximize implementation of adaptation strategies to ensure public health and safety and to protect the capital investment</li> <li>5. Support Economic Development and Enhance property values</li> <li>6. Support green collar job creation</li> </ol>
Materials + Waste <b>M+W</b>	<ol style="list-style-type: none"> <li>1. Maximize construction-waste reduction and recycling</li> <li>2. Maximize the reuse of materials and the use of recycled materials</li> <li>3. Minimize transport distance of materials and incentivize local and regional extraction and manufacture of materials</li> <li>4. Support sustainable production practices</li> </ol>

**OBJECTIVES**

**CATEGORIES**

<ol style="list-style-type: none"> <li>1. Reduce urban heat island effect</li> <li>2. Use low-emitting materials</li> <li>3. Promote alternative fuel use</li> <li>4. Reduce emissions related to construction activity</li> </ol>	<p><b>C+A</b> Climate + Air Quality</p>
<ol style="list-style-type: none"> <li>1. Implement the Complete Streets policies and Placemaking polices (in progress)</li> <li>2. Create unique, quality spaces within the public right-of-way that reflect the local neighborhood</li> <li>3. Educate and promote environmental awareness and the environmental benefits of the projects</li> <li>4. Include stakeholder input in project decision making process</li> </ol>	<p><b>B+C</b> Beauty + Community</p>
<ol style="list-style-type: none"> <li>1. Create and support natural habitat</li> <li>2. Protect and restore natural habitat</li> <li>3. Allow for interaction and observation of both people and the natural world</li> </ol>	<p><b>UE</b> Urban Ecology</p>
<ol style="list-style-type: none"> <li>1. Maintain the site year round to ensure environmental benefits</li> <li>2. Identify and develop design tools to predict performance</li> <li>3. Evaluate, verify and document performance and update design tools</li> </ol>	<p><b>C</b> Commissioning</p>

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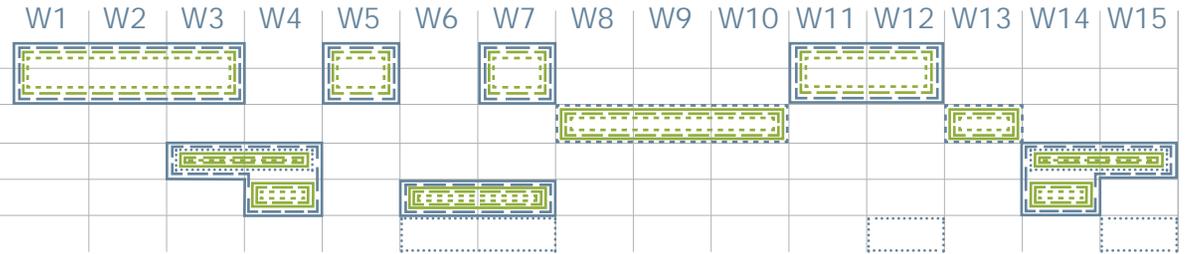
CONCLUSION

**W WATER**

**OBJECTIVES**

- Reduce basement and street flooding
- Reduce (CSO) events and volumes
- Reduce potable water use
- Clean stormwater to natural water bodies
- Reduce non-point source pollution
- Ensure erosion and sediment control

**REQUIREMENTS**



**STRATEGY**

- [Solid Blue Box] Stormwater Pavement
- [Dashed Blue Box] Stormwater Landscape
- [Dotted Blue Box] Irrigation
- [Dotted Blue Box] Stormwater Pollution Plan
- [Solid Green Box] Soil Strategy
- [Dashed Green Box] Tree Canopy
- [Dotted Green Box] Site Vegetation



## CATEGORY

Water refers primarily to stormwater and how infrastructure projects should manage those stormwater flows in order to improve water quality in local water bodies, reduce flooding, and anticipate more frequent, intense storm events. This category also refers to water used for irrigation and the reduction of potable water use.

Water quality for the Chicago River is threatened by numerous sources, including point discharge from combined sewer overflows (CSOs) and urban runoff. CSOs degrade water quality in the Chicago River, which is being increasingly turned to as a place for recreation. Several pilot projects have demonstrated that reducing CSOs with green infrastructure is a feasible option, even in a densely populated and impervious urban area like Chicago.

The public right-of-way and infrastructure plays a crucial role in stormwater management in the city, since in most instances, streets convey stormwater directly into the combined sewer system. Using these streets, instead, to slow the flow, capture, and then recharge or discharge, provides the system with more time to manage storm events. All projects should target green infrastructure on the CSO and sewer-shed level as well as address localized flooding.

Sustainable solutions should intercept run-off on-site and either retain it or detain it to reduce peak flow. This is achieved by minimizing impermeable surfaces, increasing infiltration through recharging groundwater, conserving ecosystems, reducing the use of pipes, and increasing natural channels such as bioswales or infiltration gardens. In addition to managing peak storms and flood protection, the minor storms—because of their frequency and cumulative impacts—make the largest contribution to total annual runoff volume and often carry heavy pollutant loads, and therefore have a large impact on water quality. Water quality is improved by reducing the possibility of CSO and by decreasing non-point source pollution.

Water is vital for establishing healthy, robust, long-lived street trees and plantings, which contribute to clean air and beautiful places. However, irrigation practices must observe the best available conservation technology so that potable water use is reduced. This goes hand in hand with stormwater BMPs, as the use of stormwater for irrigation can address both issues with a single strategy. When potable water is needed, it is important to use it wisely. Smart irrigation systems can allow CDOT personnel to shut off systems when they are not needed and supplement them during times of drought.

The five objectives for water have been prioritized so that the crucial goals to solving the regions stormwater challenges are emphasized on every possible project. Eliminating flooding basements and streets reduces costs, supports economic development, and helps ensure transportation access for all uses even during storms and emergency events. It reduces long-term fixed costs for conveying and cleaning stormwater and creates more beautiful environments while doing it, which support habitat and economic development.

These objectives and their associated requirements and policies are then translated physically as permeable pavements in roads, parkways that are bioswales, tree planters, rain-garden planters, landscaped medians, planted rainwater bumpouts, green alleys, and permeable walkways.

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## REQUIREMENTS WATER

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
W1a	Rate Control: Green Infrastructure shall be used to control stormwater from all the public right-of-way that can be made tributary to best practices as outlined in Volume 2 of this document. The target release rate for the project's right-of-way (ROW) shall be 0.9cfs/acre for the 5-year event. The release rate shall be met using a combination of strategies including limiting the size of the underdrain, limiting the amount and location of underdrain, and use of restrictors as further discussed in Volume 2 of this document.		
	The City of Chicago Stormwater Tool spreadsheet shall be used to calculate the required volume for the 5-year event to meet the target release rate. The required 5-year volume shall be provided without on-street storage. The calculations shall be based on runoff from the ROW and consider private property and other catchment area outside the project ROW as described in Volume 2 of this document.		
	See Volume 2 of this document for special treatment of this requirement in the Central Business District  See W5 for additional stormwater control requirements		
W1b	Rate Control: Install green infrastructure to provide rate control to the maximum extent practicable through the implementation of BMP measures as identified in Volume II.		
W2	Volume Control: To the extent practicable, green infrastructure systems shall be installed as outlined in Volume 2 of this manual and shall be used to intercept runoff upstream of ROW catch basins to maximize the area available for infiltration and water loss through evapotranspiration. Stormwater BMP's shall maximize lateral distribution of stormwater storage and inter-connect individual BMP's to increase opportunities for infiltration and to minimize points of overflow into the sewer system. No exclusive volume control storage is required. See additional requirements under W5.		
W3	Proximity to a waterway: Projects located within 1/4 mile of a waterbody or a separate storm sewer that drains to a waterway must conduct an assessment to determine feasibility of diverting the runoff to the waterway or storm sewer. If feasible, stormwater shall be diverted to a waterway or separated storm sewer. In cases of overland overflow, erosion control must be considered as part of the design of projects.		

**REQUIREMENTS WATER**

CODE	EFFECTIVE JANUARY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
W3 (cont)	<p>Projects located within 1/8 miles of a waterbody or a separate storm sewer that drains to a waterway shall divert runoff to the waterway or separate storm sewer. In cases of overland overflow, erosion control must be considered as part of the design of projects.</p> <p>Projects adjacent to a waterbody or a separate storm sewer shall discharge runoff to such outlets.</p> <p>This requirement may be waived in areas of the City where it has been shown that this requirement would exacerbate overbank flooding and not improve conditions in the combined sewer system.</p>		
W4	<p>Water Quality Treatment: Discharges to a waterway, wetland, or separate storm sewer system draining to a waterway shall be designed to provide 80% removal of total suspended solids. (Generally applies to areas on the City of Chicago Outlet Capacity Release Rate maps designated as non-contributing area.) Projects utilizing stormwater landscapes and/or stormwater pavements meeting the rate and volume requirements may be assumed to meet this requirement for the area served by these features.</p>		
W5	<p>Where the soil map (See Figure 3-2 in Chicago January 2012 Stormwater Manual) and/or borings indicate sandy soils or where infiltration tests indicate soils with infiltration rates of 1.4 inches per hour or better, both volume control and rate control measures shall be implemented. The minimum volume control provided shall be 0.5 inches on at-grade impervious surfaces. Rate control volume shall be provided per requirement W1a.</p>	<p>The 2013 requirements shall apply. Project experience will be used to evaluate potential increases in the requirement.</p>	<p>The 2015 requirements shall apply. Project experience will be used to evaluate potential increases in the requirement.</p>

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## REQUIREMENTS WATER

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
W6	<p>A Stormwater Pollution Prevention Plan shall be prepared if the project involves soil disturbance, major reconstruction or grinding and resurfacing adjacent to proposed stormwater BMP's or water bodies and as required by Illinois EPA. All existing stormwater features, including permeable paving and bioretention shall be protected from construction site runoff and debris.</p>		
W7	<p>Existing stormwater BMP's shall be protected during maintenance activities. All maintenance and repair work shall replace existing stormwater landscapes and stormwater paving in-kind. Infiltration rates and grades are to be repaired or maintained to ensure function as originally designed and constructed. Required and appropriate measures shall be taken to manage stormwater if work is being done on or at the BMP itself.</p>		
W8	<p>Passive Irrigation: All landscape areas shall be designed with passive irrigation where possible (runoff shall be directed toward the landscape area to supplement rainfall and storage shall be provided below or adjacent to the root zone to provide supplemental water through capillary action).</p>		
W9	<p>Rainwater Reuse: When needed and where feasible, rainwater collection and reuse systems shall be evaluated to supplement irrigation needs beyond rainfall and passive irrigation.</p>		
W10	<p>Smart Irrigation Systems: If an irrigation system is required, the systems shall be controlled by smart irrigation technologies that apply water based on soil moisture requirements.</p>		

**REQUIREMENTS WATER**

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CODE	EFFECTIVE JANUARY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
W11	Sustainable Backyards: CDOT will cross-promote Sustainable Backyards programs to encourage adoption of green infrastructure (GI) practices on adjacent residential properties. In partnership with the Sustainable Backyards program:		
	<ul style="list-style-type: none"> <li>• Reach up to 500,000 residents annually via advertisements and 2,500 via events</li> <li>• Promote program at 20 partner events and hold 20 workshops annually</li> <li>• Target adoption of GI on up to 50 nearby properties</li> <li>• Hold up to 3 Green Training-the-Vendors workshops annually at the Chicago Center for Green Technology</li> </ul>		
W12	CDOT will provide training on how to design, construct and maintain stormwater BMP's. Develop educational programs for: <ul style="list-style-type: none"> <li>• Contractors</li> <li>• Resident Engineers</li> <li>• Engineers</li> <li>• Maintenance Personnel</li> <li>• Utilities</li> </ul>		
W13	CDOT will encourage and promote the creative use of stormwater for fountains, public display, education and public art. Develop a requirement to incentivize these types of stormwater BMP's in future projects.		
W14	Within sensitive areas as identified by the DWM sewer sensitivity model and mapping, CDOT will coordinate project planning and design with DWM to evaluate opportunities to enhance project performance to achieve shared objectives.		
W15	CDOT will develop stormwater BMP mapping and a moratorium to ensure BMP protection and coordination within the ROW. This data will be used to facilitate interagency coordination and coordination of past, present, and future BMP designs to optimize system performance.		

**EN ENERGY OBJECTIVES**

**REQUIREMENTS**

	EN1	EN2	EN3	EN4	EN5	EN6	EN7	EN8	EN9	EN10	EN11	CA8	CA10
Reduce energy use	Lighting		Lighting	Lighting			Lighting	Lighting	Lighting	Lighting	Lighting	Lighting	Lighting
Use clean and renewable energy						Alternative Energy Use	Alternative Energy Use				Alternative Energy Use		
Generate and transmit renewable energy													

**STRATEGY**

- Lighting
- Alternative Energy Use

**CATEGORY**

Energy, and its heavy reliance on the use of fossil fuels, which create air quality and climate change impacts, refers both to the direct energy consumed by CDOT projects and the sourcing or siting of renewable energy facilities.

Lighting is the most significant direct consumer of electricity in the public right-of-way. Reduced energy use promotes a sustainable environment by reducing the consumption of non-renewable fuels and thus the release of carbon emissions. Light pollution is also reduced by the efficient use of street lighting that uses cut-off fixtures, which direct light downwards—where it is helpful—rather than in all directions.

These energy objectives translate into physical elements such as different light fixtures, a change in the color of light, solar panels, and wind turbines on stand-alone

lights, the incorporation of electricity fueling stations in parking lanes and beneath the pavement (such as a series of pipes and conveyances for district cooling and heating), and the use of street foundation as a geothermal field. The energy objectives also translate into smarter light fixtures that can let CDOT personnel know when they are not functioning properly, control luminance levels, and provide information about energy use. This not only helps reduce energy use, it reduces maintenance costs and improves safety by helping to ensure that lights are on when they need to be and off when they do not need to be on. Wind and solar light fixtures can be installed without expensive underground wiring systems and can operate even during power outages.



**REQUIREMENTS ENERGY**

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
EN1	<p>Light appearance: All lighting shall use white light and shall have a color temperature between 4000 and 4600 Kelvin with a color rendition index of 85 or greater.</p> <p>Lighting Assembly: Bulb life shall be equal to or greater than 30,000 hours for high intensity discharge (HID) or induction sources and 60,000 hours with a 10 year warranty for LED systems including driver.</p> <p>Brightness and Glare: Retrofitted and new arterial, viaduct, and alley Street lighting should be designed to meet the most recent edition of the recommended Illuminating Engineering Society (IES) minimum guidelines. Lighting should meet these minimums at 70% of max output to allow for flexibility in lighting levels due to community needs.</p>	<p>Lighting Assembly: Bulb life shall be equal to or greater than 40,000 hours for high intensity discharge (HID) or induction sources and 60,000 hours with a 10 year warranty for LED systems including driver.</p> <p>Brightness and Glare: Retrofitted and new arterial, viaduct, residential, and alley street lighting should be designed to meet the most recent edition of the recommended IES minimum guidelines. Lighting should meet these minimums at 70% of max output to allow for flexibility in lighting levels due to community needs.</p>	<p>Lighting Assembly: Bulb life shall be equal to or greater than 50,000 hours for high intensity discharge (HID) or induction sources and 60,000 hours with a 10 year warranty for LED systems including driver.</p>
EN2	<p>All new or retrofitted arterial lighting will be cut-off, including pedestrian, alley, and viaduct fixtures. All above ground CTA platforms to use full-cut off lighting.</p>	<p>All new or retrofitted arterial lighting including pedestrian, alley, viaduct and residential lighting will be cut-off. All above ground CTA platforms to use full-cut off lighting.</p>	

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**REQUIREMENTS ENERGY**

CODE	EFFECTIVE JANUARY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
EN3	All new or retrofitted traffic signals, pedestrian countdown signals, and bike signals shall be light-emitting diode (LED).		
EN4	All new and replacement or retrofitted light fixtures (on poles installed within last 10 years) will be equipped with wi-fi smart grid technology capacity at the time of installation, replacement or retrofit.	All new and replacement or retrofitted light fixtures (on poles installed within last 10 years) will be equipped with wi-fi smart grid technology at the time of installation, replacement or retrofit. Smart grid technology shall identify unique fixture whenever possible.	
EN5	No light trespass shall be allowed into environmentally sensitive areas, as calculated in Volume 2. Light trespass should be limited to the values recommended in IES RP-33 Lighting for Exterior Environments or TM-11 Light Trespass Recommendations.		
EN6	Use alternative energy source for bus stops, Intelligent Transportation Systems (ITS), and warning signs. Maximize on-site renewable energy generation for energy needs. See Volume 2 for details on alternative energy source.		
EN7	All CTA station light fixtures should be LED and should comply with CTA light levels as published in CTA guidelines.		

**REQUIREMENTS ENERGY**

CODE	EFFECTIVE JANUARY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
EN8	Education of public: CDOT will create an education/media campaign to explain the benefits of white light and reduced energy use, dark skies and cut off fixtures. This effort will be tied into efforts by the Chicago Center for Green Technology (CCGT).		
	CDOT will pilot the use of LED streetlight fixtures including pedestrian and viaduct lighting.	CDOT will create and implement a plan to upgrade and retrofit City street lighting to dramatically reduce energy use compared to 2012 baseline and use infrastructure trust to help fund through energy and maintenance savings based on data gathered between 2013 and 2015. Energy savings must achieve minimum of 35% energy savings, special consideration should be given to fixtures that achieve more savings while meeting IES standards for roadway areas.	
EN9	<p>CDOT will work with advocacy organizations to do an economic analysis to match our technical analysis.</p> <p>CDOT will inventory all existing fixtures and update atlas, establish inventory management process.</p>		
EN10		CDOT will issue an RFP for a comprehensive, open platform, wi-fi smart technology platform. Smart controllers should include remote dim/bright, individual reporting of fixtures & lumen output, wattage, voltage, and amperage. (System must address other systems besides lighting, including but not limited to security and irrigation)	CDOT will have a fully operational smart grid for lighting.
EN11			CDOT will develop and introduce legislation to permit district heating and cooling within the public right-of-way

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**EC ECONOMICS OBJECTIVES**

**REQUIREMENTS**

	EC1	EC2	EC3	EC4	EC5	EC6	EC7	UE4	UE7	UE12	CM3	CM5
Quantify the environmental value of investment												
Maximize environmental benefits												
Streamline utilities to minimize environmental impact												
Ensure public health and safety to protect investment												
Enhance property values and economic development												
Support green collar job creation												

**STRATEGY**

- Sustainability Valuation
- Tree Canopy
- Site Vegetation

**CATEGORY**

The economy (and economic development) is one of the classic trio (economics, society, environment) that comprise sustainability. Considering the whole-life cost and complete economic impact of actions should be reflexive when long-term infrastructure investments are considered. Economics covers activities such as coordination of projects to achieve economies of scale and avoid re-work, as well as the quantification of environmental and social benefits—sometimes referred to as externalities—so that the full value of a project can be expressed. For the purposes of these guidelines, climate adaptation

strategies are noted under economics, given the importance of resiliency to ensure public health and safety as well as to protect capital investment.

These objectives are not necessarily physical components of the project, though the analysis behind many of them will inform design choices. Quantification of environmental value is the top priority, due to the need to consider full life-cycle costs and the full range of benefits provided when considering infrastructure investments. The cheapest solution is not always the best economic value.



**REQUIREMENTS ECONOMICS**

<b>CODE</b>	<b>EFFECTIVE JULY 2013</b>	<b>EFFECTIVE JANUARY 2015</b>	<b>EFFECTIVE JANUARY 2018</b>
EC1	Conduct a Sustainability Valuation analysis for a pilot project in conjunction with a Value Engineering (VE) study per FHWA requirements	Perform and maximize a sustainability cost-benefit analysis for all bridge projects over \$20M that perform a Value Engineering (VE) study and roadway projects over \$25M that perform VE study	Perform and maximize a sustainability cost-benefit analysis for all projects over \$10M
EC2	Identify and review current and future projects with the Office of Underground Coordination (OUC) and the Infrastructure management Conflict Resolution database, the Department of Housing and Economic Development (DHED), and the Public Building Commission to identify potential synergies and/or construction conflicts		
EC3	Collect and provide individual project data in accordance with CDOT environmental performance measures (as referenced in various strategies)		
EC4	Establish a plan for implementation of shared utilities trenches within public ROW		
EC5	Support economic development efforts near the project through consultation with surrounding residents and business owners		
EC5	Progressively update CDOT term contracts to incorporate sustainable vendor requirements and sustainability elements		
EC6	<p>CDOT will partner with Greencorps Chicago to train workers and fill job opportunities with city residents</p> <ul style="list-style-type: none"> <li>• Improve public safety by training and employing individuals with barriers to employment through CDOT's Greencorps Chicago program</li> <li>• Identify other opportunities for training and employment within CDOT and with CDOT contractors for Greencorps Chicago graduates</li> </ul>		
EC7	By 2018, develop a sustainable cost-benefit analysis tool for CDOT projects to facilitate value planning.		

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**MW MATERIALS AND WASTE OBJECTIVES**

**REQUIREMENTS**

	MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15
Maximize waste reduction and recycling	■				■										■
Maximize the recycled content of materials		■	■	■	■										■
Incentivize local materials															
Support sustainable production practices						■	■	■	■	■	■	■	■	■	■

**STRATEGY**

- Waste Management and Reduction
- Recycled Materials
- Cool Pavement
- Transport Distance
- Warm Mix Asphalt



## CATEGORY

Materials and waste address the type of materials selected in design to be used on projects and how all materials are dealt with during construction.

Material recycling conserves natural resources and reduces landfill waste. Material recycling is another area of sustainability that can be incorporated into almost every project by means of two specific methods. The first method requires that contractors either reuse or recycle a significant amount of demolition materials. These materials then can be reutilized for roadway reconstruction or sent to recycling facilities for reuse, rather than extracting and hauling virgin materials. The second method utilizes recycled materials or industrial by-products in specified items and materials. This is especially pertinent for pavement mixes and aggregates. Asphalt pavements can greatly reduce their carbon footprint and cost by using ground tire rubber, asphalt shingles, and reclaimed asphalt pavement to offset the use of virgin binder. Concrete can greatly reduce its carbon footprint and cost by using cement replacements such as ground gas-furnace slag, fly ash, or limestone. Concrete can also contain recycled wash water, and both asphalt and concrete can contain recycled aggregates.

Materials also address the use of local materials and the environmental impact of their transportation to the project site. Materials that are manufactured and extracted within a limited distance from the project site reduce emissions, support the local and regional economy and often reduce costs.

The urban heat island effect is becoming an increasing problem in large cities during summer months. This phenomenon is the inflation of hot temperatures in cities when compared with surrounding rural and suburban areas and is caused by the built-up environment and concentration of human activities. Material choice in pavements can have an impact on the urban heat island effect. By using more-reflective pavement surfaces, permeable pavements, and increased landscaping coverage these “cool pavement strategies” can benefit air quality and energy consumption (through decreased air conditioning needs) and can enhance human health and comfort.

When these objectives take physical form, they do not look remarkably different from current projects; however, their design and production can be significantly different. This can affect testing, quality control, and installation methods, but should not reduce performance requirements.

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**REQUIREMENTS MATERIALS + WASTE**

<b>CODE</b>	<b>EFFECTIVE JULY 2013</b>	<b>EFFECTIVE JANUARY 2015</b>	<b>EFFECTIVE JANUARY 2018</b>
MW1	Projects shall divert 50% construction and demolition waste, as calculated in Volume 2, from landfills.	Projects shall divert 65% construction and demolition waste, as calculated in Volume 2, from landfills.	Projects shall divert 75% construction and demolition waste, as calculated in Volume 2, from landfills.
MW2a	20% of the total materials value, for projects over \$5M, shall be from recycled materials, as calculated in Volume 2.	20% of the total materials value, for projects over \$3M, shall be from recycled materials, as calculated in Volume 2.	20% of the total materials value, for projects over \$1M, shall be from recycled materials, as calculated in Volume 2.
MW2b	Projects under \$5M shall specify materials so that 10% of the total materials value is from recycled content as calculated in Volume 2.	Projects under \$3M shall specify materials so that 10% of the total materials value is from recycled content as calculated in Volume 2.	Projects under \$1M shall specify materials so that 10% of the total materials value is from recycled content as calculated in Volume 2.
MW3	When asphalt is used a minimum asphalt binder replacement of 20% is required.	When asphalt is used a minimum asphalt binder replacement of 30% is required.	When asphalt is used a minimum asphalt binder replacement of 40% is required.
MW4	When concrete is used a minimum of 20% total recycled content by weight is required. A minimum of 10% of the cementitious materials by weight should be from recycled content and/or ground limestone.	When concrete is used a minimum of 30% total recycled content by weight is required. A minimum of 15% of the cementitious materials by weight should be from recycled content and/or ground limestone.	When concrete is used a minimum of 40% total recycled content by weight is required. A minimum of 30% of the cementitious materials by weight should be from recycled content and/or ground limestone.
MW5	Develop a waste management plan that diverts waste from landfills.		
MW6	Maximize use of cool pavement strategies within project area.	Implement and maximize the use of at least one cool pavement strategy within project area.	Implement and maximize the use of at least two cool pavement strategies within project area.

## REQUIREMENTS MATERIALS + WASTE

CODE	EFFECTIVE JANUARY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
MW7	When concrete is used, a minimum initial albedo of 0.3 is required.		When concrete is used, a minimum initial albedo of 0.3 is required, with a minimum albedo of 0.2 after 1 year.
MW8	Reduce the mixing temperature of all hot mix asphalt to 330 degrees F.	Reduce the mixing temperature of all hot mix asphalt to 310 degrees F.	Reduce the mixing temperature of all hot mix asphalt to 290 degrees F.
MW9		A minimum albedo of 0.3 is required for a minimum of 100% of non-roadway pavement surface by area or use a porous pavement for a minimum of 25% of non-roadway pavement surface.	A minimum albedo of 0.3 is required for a minimum of 100% of non-roadway pavement surface by area or use a porous pavement for a minimum of 50% of non-roadway pavement surface.
MW10	Require the use of low and non-volatile organic compounds (VOCs) in paints, sealants, adhesives, coatings, etc.		Eliminate the use of volatile organic compounds (VOC's) in paints, sealants, adhesives, coatings, etc.
MW11	15% of projects total materials value must be manufactured and extracted from within distance of the project site as specified in Volume 2.	30% of projects total materials value must be manufactured and extracted from within distance of the project site as specified in Volume 2.	45% of projects total materials value must be manufactured and extracted from within distance of the project site as specified in Volume 2.
MW12	Investigate and develop a policy for use of ternary mixes in non high performance concretes (HPC).		
MW13	CDOT will consider climate change adaptation in the selection of materials.		
MW14	Incorporate materials requirement into term, commodity and JOC contracts used by CDOT.		
MW15	Work with IDOT to continually pilot new materials and techniques and incorporate into IDOT standard specifications.		

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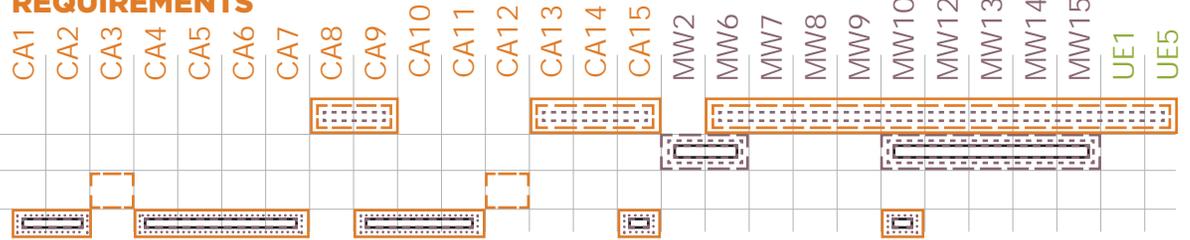
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**CA CLIMATE + AIR QUALITY OBJECTIVES**

**REQUIREMENTS**

- Reduce Urban Heat Island effect
- Use Low-emitting materials
- Promote alternative fuel use
- Reduce emissions



**STRATEGY**

- Construction Air Quality
- Alternative Fueling Sources
- Recycled Materials
- Cool Pavement
- Transport Distance
- Warm Mix Asphalt



## CATEGORY

Climate and air quality requirements primarily cover construction activities that improve air quality and reduce GHG emissions. They also address the vehicles that use the roads and how the design and maintenance of transportation infrastructure can greatly reduce emissions.

Studies have shown that construction activity has a significant carbon footprint and can greatly decrease air quality in the immediate surroundings. Reducing idling, requiring equipment and fleets that reduce exhaust pollutants, and using alternative fuels can greatly improve air quality and reduce fossil fuel use. Paying attention to where equipment is staged, shortening construction duration, and taking measures to control dust also have a big impact on localized air quality. Often these objectives can be achieved without changing the design, but can be achieved through careful planning and forethought before and during construction.

Furthermore, while how we design, build, and maintain transportation infrastructure has a significant impact on the environment, the vehicles that use them have an even more significant impact. Using synchronized traffic signals to keep vehicles moving at consistent target speeds and performing regular maintenance to ensure smooth pavements can greatly improve the fuel efficiency of vehicles. Encouraging public transportation and other modes of transportation that do not rely on fossil fuels also reduces carbon emissions and traffic congestion, and supports healthy lifestyles. Robust pedestrian, bicycle, rail, and public transit infrastructure provide low- to no-carbon emission transportation choices. Transit demand management policies and access to real-time traffic and transit information allows users to make informed transportation decisions.

**REQUIREMENTS CLIMATE + AIR QUALITY**

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
CA1	Require ultra-low sulfur diesel and enforce a 3-minute anti-idling ordinance during construction		
CA2	Effective January 2014: Pre-1998 trucks and Pre-Tier 1 non-road equipment prohibited if not retrofit. Clean Fleet Score of 2.1 required.	Effective January 2017: Pre-1998 trucks and Pre-Tier 1 non-road equipment prohibited if not retrofit. Clean Fleet Score of 3.0 required.	Effective January 2020: Pre-1998 trucks and Pre-Tier 1 non-road equipment prohibited if not retrofit. Clean Fleet Score of 4.0 required.
CA3	Alternative Fuel Vehicles: Consider potential opportunities to integrate alternative fuel vehicle fueling or charging stations at sites.		
CA4	Deconstruction vs. Demolition: Promote deconstruction over demolition where feasible.		
CA5	Truck Staging Areas & Equipment Site Placement Designated construction vehicle staging areas shall be identified in locations that are away from any building’s air ventilation intake system and subject to City’s idling reduction ordinance. Vehicles and equipment on site shall be located away from building air intake systems as best as possible.		
CA6	Dust Control: Employ least water impacting site dust control best practices.		
CA7	Air Quality Action Days: If an Air Quality Action Day is predicted, the project shall encourage site workers to reduce emissions and/or delay work for that particular day.		
CA8	All projects that include new signal work should design signal timing to minimize traffic congestion and idling while supporting pedestrian safety. Projects over one mile in length should consider incorporating synchronized signal timing to reduce traffic congestion and idling.		All projects that include new signal work should design signal timing to minimize traffic congestion and idling while supporting pedestrian safety. Projects over one mile in length and over \$3M shall incorporate synchronized signal timing to reduce traffic congestion and idling.

**REQUIREMENTS CLIMATE + AIR QUALITY**

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
CA9	Pavement Restoration: Maintenance protocols and utility restoration should ensure smooth and even pavement surfaces to reduce rolling resistance of vehicles, control noise, and increase safety.		
CA10	Traffic management plans shall be designed to minimize traffic congestion and vehicle idling and reduce construction schedules to the extent possible while minimizing impacts to local businesses and the community.		
CA11	Work with the Department of Fleet and Facility Management (2FM) to develop ways to green CDOT's heavy vehicle fleet.		
CA12	Work with city procurement and sister departments to incentivize use of alternative fuels in construction vehicles and pilot enforcement in 2015.		
CA13	Support Public Transportation infrastructure and use through the inclusion of bus rapid transit infrastructure, improvements in seating and protection at bus stops, connections between bus, bike and rail and improved and new train stations.		
CA14	Advocate for and support CREATE projects and policies.		
CA15	Develop and launch a regional Transportation Demand Management Program to reduce single occupancy vehicle trips region-wide. Implement employer based, neighborhood based and consumer based tools and strategies that reduce traffic congestion and improve air quality.		

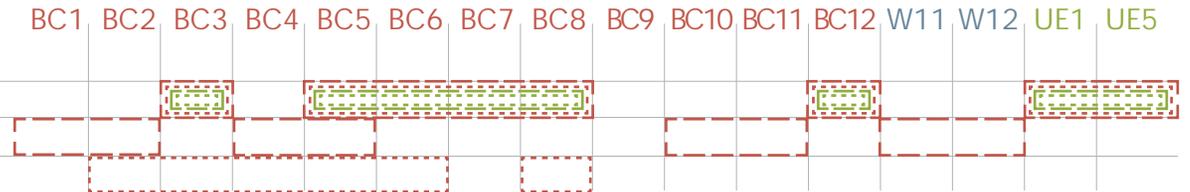
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**BC BEAUTY AND COMMUNITY OBJECTIVES**

**REQUIREMENTS**

- Implement the Complete Streets policies
- Create unique and quality spaces
- Promote environmental awareness
- Include stakeholder input



**STRATEGY**

- Noise Mitigation Plan
- Education Outreach
- Stakeholder Involvement Plan
- Tree Canopy
- Site Vegetation



**CATEGORY**

Educating the public about the sustainable strategies used on a project is often at the heart of its success. Sustainable solutions, design, and construction methods may not be obvious or understood by the public. For a project to include new technologies and ideas that support and protect the environment, community support may be required. People cannot expect to support or maintain what they do not understand; therefore, educating the public, local community groups, and users is critical for project success. Public meetings, flyers, tours, exhibits, and project signs enhance how the community supports changes to the built environment. It is critical that these strategies and others are implemented throughout the life of a project. It is also important to educate designers, resident engineers, contractors, and maintenance personnel so that they, too, understand the importance of environmental best practices and why and how they can best be implemented to ensure that the goals and objectives of this document are met.

Furthermore, the public right-of-way represents over 70 percent of the publicly owned open space in the city and is a part of the everyday experience of its citizens. Its beauty and sense of place is therefore fundamental to creating a high quality of life for those that live, work, and play in the city. Beauty is not just a nice extra, it is

fundamental to creating a sustainable city. It is one of the key elements that attracts and retains citizens as well as businesses, leading to healthy communities and economies. Creating complete streets with a strong sense of place that support and protect the environment is part of this equation. Incorporating landscaping, art, community identity and programming is also important.

It is also important to look beyond the public right-of-way and at the community as a whole. There are many environmental best management practices that can be implemented by homeowners, businesses, and institutions that expand the impact of improvements made in the public way. CDOT administers several programs, including the Chicago Conservation Core and Sustainable Backyards program that support these initiatives. Just as critical is project coordination with adjacent public or private development. This can lead to efficient use of resources, opportunities for greater environmental impact and development of open space.

These objectives are demonstrated in the quality of the elements in projects, as well as through educational elements. Objectives speak to how the project is carried out, the process of delivery, and guide outreach during project delivery.

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
BC1	Provide public education about environmental sustainability through outreach materials.		
BC2		For all projects over \$20M provide permanent on-site signage or other educational materials for sustainability. And for any project with stormwater Best Management Practices (BMP's) that will be maintained by the community, provide education on environmental function and maintenance.	For all projects over \$10M provide permanent onsite signage or other educational materials for sustainability. And for any project with stormwater Best Management Practices (BMP's) that will be maintained by the community, provide education on environmental function and maintenance.
BC3	For projects over \$10M, design the project according to the principles of Context Sensitive Solutions (CSS).	For projects over \$5M, design the project according to the principles of CSS.	For projects over \$1M, design the project according to the principles of CSS.
BC4	Create a Stakeholder Involvement Plan.		
BC5	Partner with community groups to maximize environmental, Placemaking and Complete Streets benefits and objectives outside of the public right of way.		
BC6	Conduct an inventory of adjacent properties and the public right of way for potential to create additional and improved public spaces, and coordinate with relevant agencies on opportunities.		
BC7	For projects over \$3M, dedicate 1% of total budget (not to exceed \$200,000) to art or community identifiers, culture installations or programming. Federal contributions to the project will not be required to assign 1% to art.		
BC8	Create a construction noise mitigation plan for projects near identified sensitive receptors.		
BC9	Follow Complete Streets and Placemaking guidelines.		

**REQUIREMENTS BEAUTY + COMMUNITY**

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
BC10	Integrate SUIG training and education into offerings at Chicago Center for Green Technology (CCGT). <ul style="list-style-type: none"> <li>• Develop content for specialized SUIG Green Tech U programs.</li> <li>• Hold at least 150 Green Tech U programs annually (including SUIG) both at CCGT and offsite.</li> <li>• Create educational kiosk for display at CCGT.</li> <li>• Hold annual program for resident engineer on BMPs installation at CCGT.</li> </ul>		
BC11	Through project delivery, support community-based, volunteer-led events and trainings to promote the City's SUIG and other related environmental practices through the Chicago Conservation Corps (C3), sustainable backyards and other appropriate programs.		
BC12	Pilot the use of open graded pavement for noise reduction. Consider noise reduction strategies for Lake Shore Drive.		

*Policies*

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**UE URBAN ECOLOGY OBJECTIVES**

- Create and support natural habitat
- Protect and restore natural habitat
- Allow interaction and observation to nature

**REQUIREMENTS**



**STRATEGY**

- Soil Strategy
- Site Vegetation
- Tree Planting and Canopy
- Noise Mitigation Plan
- Education Outreach



## CATEGORY

Urban ecology refers to plant and tree selection and planting design, the soil that supports them, and creating healthy habitats that support a wide range of bio-diversity. Projects contribute to citywide goals for enriching the urban ecosystem.

Physically, on projects, these strategies will be apparent in the types of plants selected, the method and manner in which they are planted, and the positioning of planted areas within the infrastructure right-of-way. A thorough understanding of what constitutes urban ecology—and what the balance is among different types of plantings deployed in different areas throughout the city—is important. Infrastructure rights-of-way provide unique opportunities to create continuous areas of habitat or links between habitats that provide ecological services, beauty, and health to residents.

Urban ecology strategies provide multiple co-benefits, including filling in and expanding the existing tree canopy and supporting existing habitat against changes in weather patterns. They support animal habitat and strive to improve unique habitats for both plants and animals. They are closely related to water and beauty and community requirements and strategies and support policies development and implemented by other departments, such as the Chicago Landscape Ordinance and Guidelines, the Calumet Plan, and the Chicago River Plan.

Requirements and policies are supported by existing initiatives such as the climate-ready roadway plant list, the Chicago Wildlife Green Infrastructure Plan and Chicago Conservation Corp.

## REQUIREMENTS URBAN ECOLOGY

CODE	EFFECTIVE JANUARY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
UE1	The project shall meet or exceed the tree count, removal, protection, canopy and other parkway planting requirements of the City of Chicago Landscape Ordinance and the Department of Forestry.		
UE2	Landscape areas shall be designed to maximize to the extent possible the acceptance stormwater runoff from adjacent surfaces within the ROW.		
UE3	The project shall provide adequate soil medium and soil volume for all landscape and tree planting zones per the City of Chicago Landscape Ordinance or in consultation with the Bureau of Forestry, and shall be designed to accommodate bioretention, maximize tree root zone, enhance soil fertility and microbial activity, and help meet stormwater infiltration and storage requirements.		
	All plant material specified shall be drought tolerant native or adapted species. No invasive species shall be used.		
	<ul style="list-style-type: none"> <li>• Where applicable, the combination of tree, understory, shrub and/or groundcover planting should consider bioregional plant community relationships as a guide for species selection.</li> <li>• Select trees and other plants according to City of Chicago-approved recommendations: refer to existing recommended plant list(s).</li> </ul>		
UE4	<ul style="list-style-type: none"> <li>• Preserve “special status” vegetation.</li> <li>• Perform compatibility and PH test on existing soil to confirm suitability for selected plants.</li> </ul>		
	Preserve and/or establish appropriate vegetation on-site based on densities appropriate for the Chicago-area. Maximize continuous root-zone, planting area, and planting layers, including vertical vegetated surfaces, to the fullest extent possible.		
UE5	Protect and enhance the riparian zone and shoreline. Encourage and develop habitat in these areas whenever possible.		
UE6	Projects over \$3M with any degree of existing or proposed planting landscaping or bioretention shall create a soil management plan to prevent compaction, erosion and disturbance of existing soils to the degree possible, establish suitable soils for intended plantings, and shall include salvage and remediation of local on-site soils where feasible.		
UE7	Incorporate climate change adaptation into overall project designs including plant and material choices. Consult the Chicago Wilderness Action Plan for Nature to determine whether your project is within a recommended Resource Protection Area or provides synergies with other portions of the plan.		

**REQUIREMENTS URBAN ECOLOGY**

CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
UE8	Develop a methodology for conducting a pre-development biological study and current condition assessment of the project site and surrounding ecosystem or watershed and implement a restoration plan that enhances or restores ecosystem functionality.		
UE9	Develop methodology for completing a site-specific wildlife assessment projects, including analysis of recommendations for Wildlife Protection and Preservation within the Chicago Wilderness Plan and the City of Chicago’s Nature & Wildlife Plan for non-NEPA projects. Report the resulting impacts that the roadway has on surrounding major ecosystems, identifying all non-human life that is impacted by the roadway facility, and provide mitigation and enhancement strategies.	The wildlife assessment should be used to inform the design of nesting locations where feasible and provide protection for endangered species where required by Endangered Species Act. Construction scheduling policies to avoid wildlife disruption should be developed as part of the wildlife assessment.	
UE10	Ensure that roadway performance does not negatively impact wetland areas and mitigate or restore wetlands where feasible. (i.e. Calumet Plan wetland requirements)		
UE11	Provide roadway plant list updated to with stormwater tolerant plants		

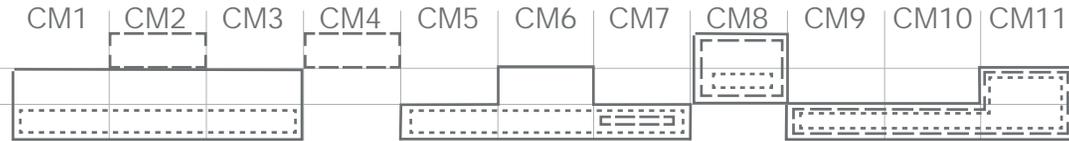
*Policies*

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**CM COMMISSIONING OBJECTIVES**

Ensure environmental benefits  
 Predict performance  
 Document performance and design tools

**REQUIREMENTS**



**STRATEGY**

- Commissioning and Monitoring Plan
- Maintenance Plan
- Cost Collection Plan

**CATEGORY**

Evaluating the performance of applied strategies is critical to informing maintenance practices and guiding future implementation of sustainable design techniques. To improve the current design and ensure the successful expansion of these practices, commissioning of the project must take place to test design assumptions, determine the long-term performance of the project, and establish maintenance protocols.

Commissioning—via modeling, monitoring, and testing—confirms that particular elements have been properly installed, have performed well, and have provided data to inform and refine subsequent design decisions. Progressive improvement is central to the concept of sustainability. The following objectives are carried out most often as reports and documentation, but there are monitoring elements that can be physically embedded in the project.



**REQUIREMENTS COMMISSIONING: MODELING**

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CODE	EFFECTIVE JULY 2013	EFFECTIVE JANUARY 2015	EFFECTIVE JANUARY 2018
CM1	For projects over \$15M, model stormwater Best Management Practices (BMPs) in conjunction with Department of Water Management (DWM) sewer model to analyze effectiveness of design and modify design to improve effectiveness.	For projects over \$10M, model stormwater Best Management Practices (BMPs) in conjunction with DWM sewer model to analyze effectiveness of design and modify design to improve effectiveness.	For projects over \$5M, model stormwater Best Management Practices (BMPs) in conjunction with DWM sewer model to analyze effectiveness of design and modify design to improve effectiveness.
CM2	For projects of \$5 million or more, create a monitoring and commissioning plan. Perform project commissioning 1 year after project completion to ensure goals have been met. All projects to coordinate with maintenance plan.		
CM3	Collect performance metric data and report on an annual basis.		
CM4	Develop a maintenance plan and identify responsible parties as a part of the design process.		
CM5	Have a LEED accredited professional on the RE and contractor team .		
CM6	Incorporate successful pilot materials into standard specifications.		
CM7		Develop Pavement Management Plan.	Begin implementation of Pavement Management Plan.
CM8	Include monitoring and commissioning curriculum in training for contractors and consultants.		
CM9	Track costs in pilot maintenance phase.	Incorporate lessons learned into projects and refine maintenance protocols.	Develop maintenance protocols for stormwater best management practices.
CM10	Launch documentation.	Create a platform or home for project specific data to be housed.	Integrate data platform with sister agencies and departments.
CM11	Develop a sustainability life cycle assessment (LCA) for CDOT projects based on data and software from tollway authority, to be used for decision making about project materials and implementation of the Chicago Climate Action Plan.		

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# 3.0 METHODOLOGY

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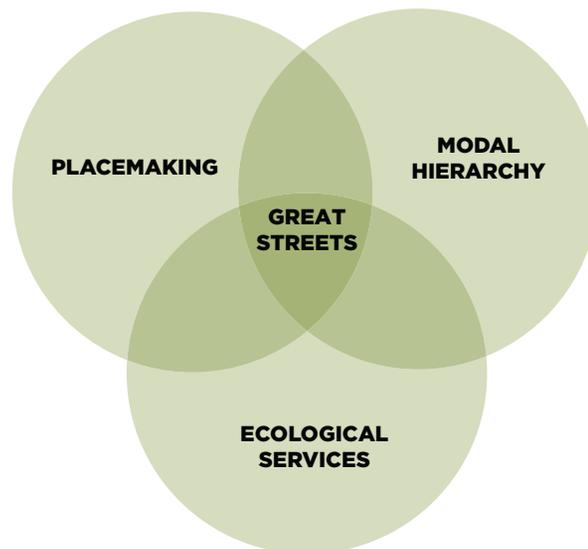
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### 3.1 APPLYING SUSTAINABILITY TO CHICAGO STREETS

Chicago has a range of street types, with varying right-of-way dimensions, adjacent land uses, types of users and traffic volumes. Street characterization can be further refined based on location of the street within the city, density of surrounding neighborhoods, special neighborhoods, as well as adjacent conditions such as a landmark parks or natural areas and the underlying soil and hydrology. Design solutions for streets that incorporate environmental data have been piloted throughout the city. These pilot studies inform the methodology discussed in this section. However, certain best practices may not be appropriate for all street typologies. The specifics of the type of street (as well as the environmental and community conditions that characterize that street) should collectively inform the sustainable design solutions proposed to create a great street.

This section discusses the typologies identified and explored through CDOT's recent Complete Streets initiative and how those typologies and a specific modal hierarchy should inform design decisions for Chicago's transportation infrastructure and public right-of-way. This section also discusses how environmental data informs the three-dimensional component of infrastructure design to get to great streets and presents strategies that can achieve the objectives and requirements of sustainable design.



#### CHICAGO STREET TYPOLOGIES

Nuances characterize streets and their use and performance. A roadway's form and function usually starts the design discussion, and as the following typologies illustrate, land use and surrounding building form and function provide another level of characterization. All of these elements influence which best practices should be applied.

It is important to keep in mind that typologies do not define specific places but help to cluster similar characteristics into general groups. As the Complete Streets document notes, these typologies provide an impression of the current state of the regional street network in scoping future work in conjunction with a range of data points. Designers should rely on field visits and fine-grained data to best approach the design of infrastructure in a specific locality.

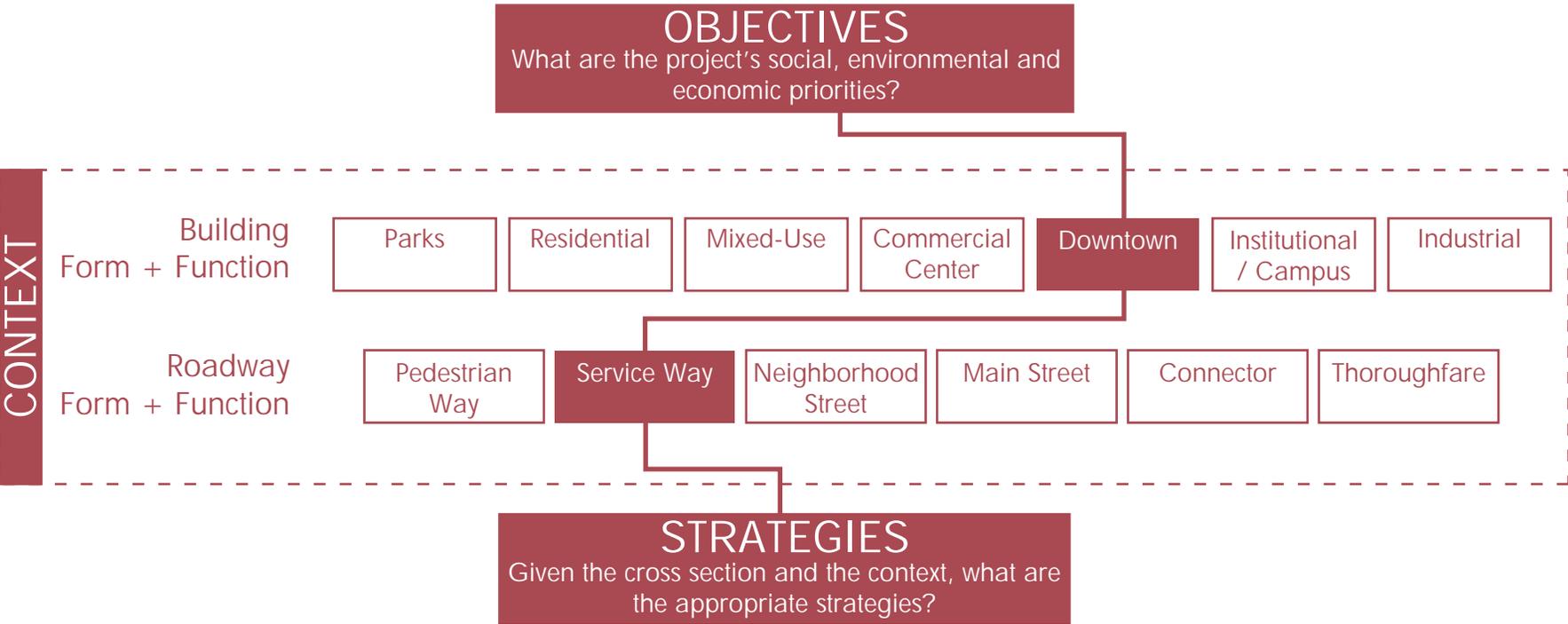
The typologies below were identified for Chicago streets:

- Thoroughfare
- Connector
- Main Street
- Neighborhood Streets
- Service Ways
- Pedestrian Ways

### CROSS WALK FROM TYPOLOGIES TO BUILDING FORM AND FUNCTION

As noted in the Complete Streets document, functional classification is required by the Federal Highway Administration for projects that use federal funds. This classification system is largely auto-centric, which limits its usefulness in an urban context. The typologies presented in the Complete Streets document are an alternative organization that steers designers to consider the wider context of the infrastructure, while still linking them to federal categories to clarify the linkage when the city applies for and receives federal money.

To best implement ecological services in the public way, it is vital that project managers and designers consider the adjacent land use and building form and function: cross walk between the Chicago-specific typology and the Chicago-specific land use. Land use varies significantly as streets roll out across the city. The changing context reinforces that there is no simple assumption for land use: projects have to respond to individual intersections and blocks.

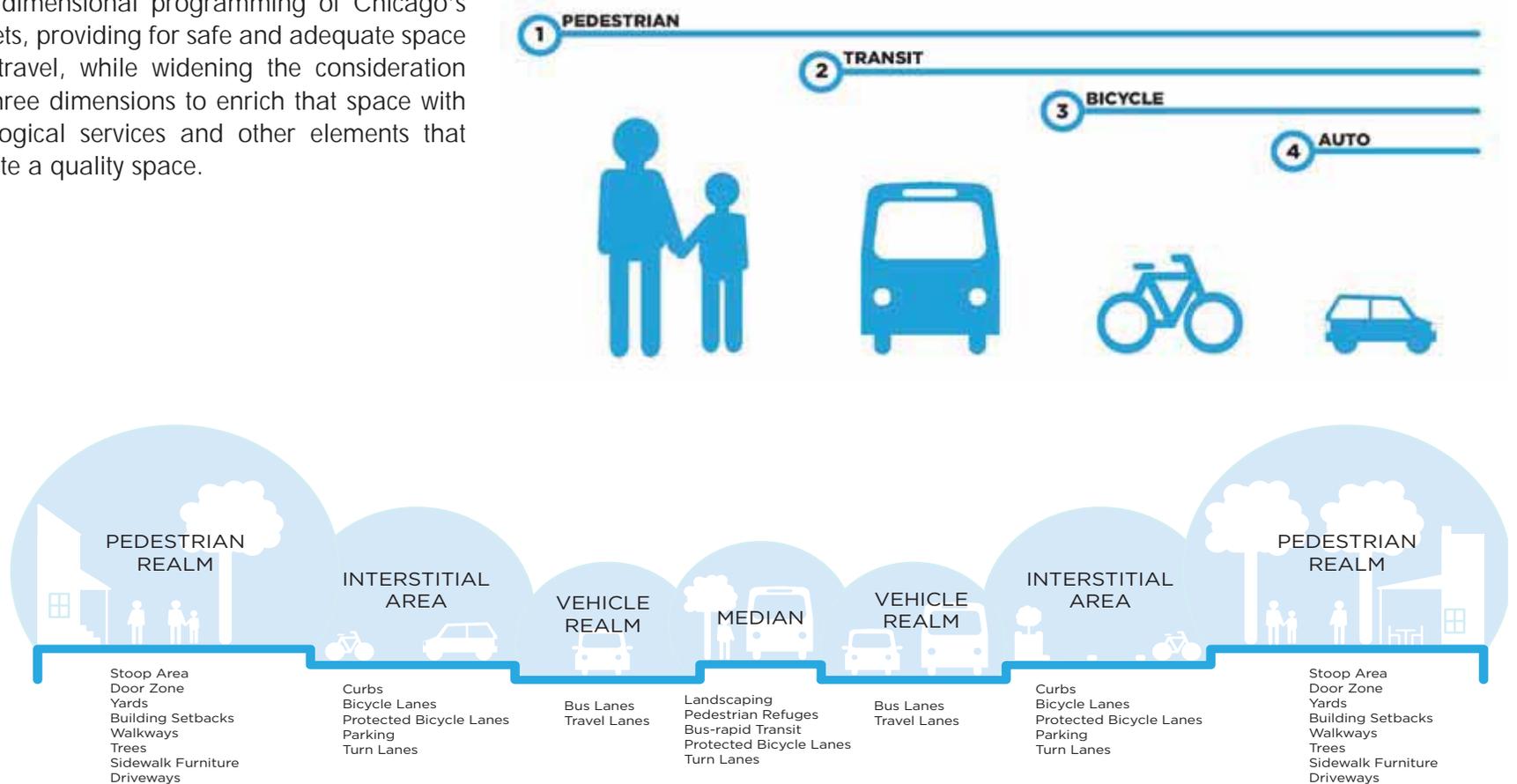


## 3.2 STRATEGIES

### MOVING FROM TWO TO THREE DIMENSIONS

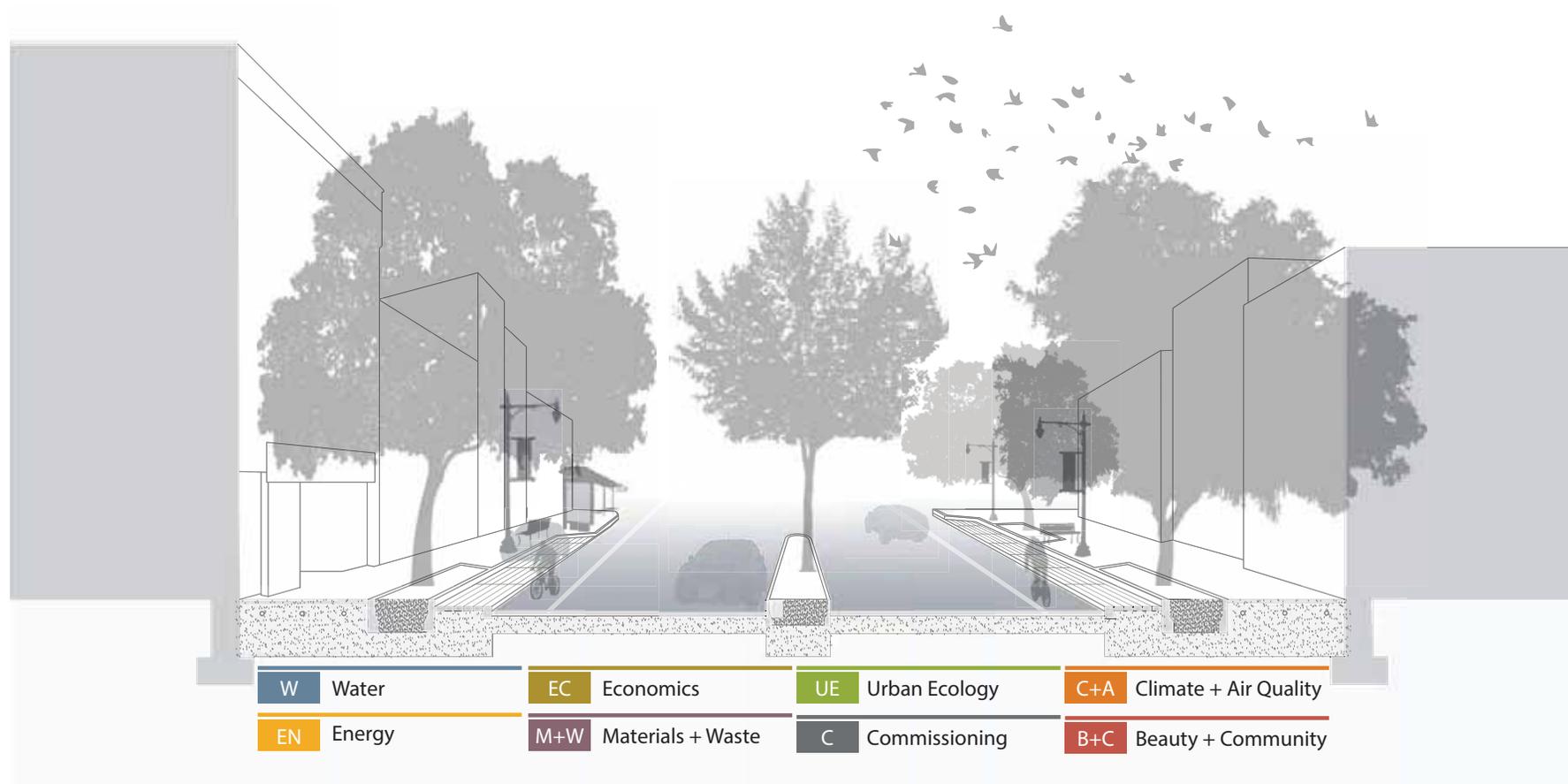
Within Complete Streets Chicago, information is provided for the horizontal arrangement of travel modes within the street. These recommendations set the modal hierarchy and provide suggestions on widths, arrangement, and additional safety features, creating a safe and efficient travel experience while lessening conflicts among modes. As noted, a modal hierarchy that prioritizes the safe movement of pedestrian and transit users—combined with a consideration of the community context—inverts the classic infrastructure design process. However, to achieve a great street, the design of that space must include information to shape a quality place and provide an ecological service.

These guidelines incorporate both the two-dimensional programming of Chicago’s streets, providing for safe and adequate space for travel, while widening the consideration to three dimensions to enrich that space with ecological services and other elements that create a quality space.



## Sustainable Urban Infrastructure Perspective

Data helps a designer to effectively enrich the complete cross section (above and below grade). Designers should reach for plans and GIS layers—which explain where urban heat island hot spots are located, what specific soil conditions are, what the surrounding land uses are—so that these points inform the calculations made to ensure that the design will perform as needed, achieving critical objectives.



## LIST OF STRATEGIES

The following sample of strategies help a designer implement new requirements.

The strategies listed in this section are a sample of the full list of strategies outlined in Volume II. They demonstrate for the designer, the interested community member, the local official, and the project implementers the various ways to achieve the objectives listed under each category. Some strategies, as shown in their arrangement and consolidation in Volume 2, work together seamlessly to achieve multiple objectives: achieving more with one action.

### W Water

- 1.1 Stormwater Pavement
- 1.2 Stormwater Landscape
- 1.3 Irrigation
- 1.4 Stormwater Pollution Plan

### EN Energy

- 2.1 Urban Responsive Lighting
- 2.2 Alternative Energy Use

### EC Economics

- 3.1 Sustainability Valuation

### MW Materials + Waste

- 4.1 Waste Management and Reduction
- 4.2 Recycled Materials
- 4.3 Cool Pavement
- 4.4 Transport Distance
- 4.5 Warm Mix Asphalt

### CA Climate + Air Quality

- 5.1 Construction Air Quality
- 5.2 Alternative Fueling Sources

### BC Beauty + Community

- 6.1 Noise Mitigation Plan
- 6.2 Education Outreach
- 6.3 Stakeholder Involvement Plan

### UE Urban Ecology

- 7.1 Soil Strategy
- 7.2 Tree Canopy
- 7.3 Site Vegetation

### C Commissioning

- 8.1 Commissioning and Monitoring Plan
- 8.2 Maintenance Plan
- 8.3 Cost Collection Plan

## PERFORMANCE MEASURES

The strategies enable project managers to meet the CDOT requirements. The more projects managers delve into addressing environmental services in their infrastructure projects, the more clear it is that as a strategy achieves a requirement, it also achieves multiple objectives. In addition to local attention and need for information on how well projects perform, the Federal government, and other grant agencies have also begun requiring performance metrics. Given the strong interest in knowing project performance in quantitative terms, a series of performance metrics have been identified for each strategy. These are provided in detail in Volume 2, along with each strategy. Below is a selection of performance measures for the strategies.

<p><b>W</b> <b>Water</b></p> <ul style="list-style-type: none"> <li>Permeable Pavement Installed</li> <li>Infiltration Planters Installed</li> <li>Potable Water Reduced</li> </ul>	<p><b>MW</b> <b>Materials + Waste</b></p> <ul style="list-style-type: none"> <li>Waste Diverted from Landfill</li> <li>Post-industrial Materials Used</li> <li>High Albedo Pavement Installed</li> <li>Local and Regional Materials Used</li> <li>Warm Mix Asphalt Installed</li> </ul>	<p><b>UE</b> <b>Urban Ecology</b></p> <ul style="list-style-type: none"> <li>Adequate Soil Medium Per Tree</li> <li>Landscape Installed</li> <li>Trees Removed, Replaced, Maintained</li> </ul>
<p><b>EN</b> <b>Energy</b></p> <ul style="list-style-type: none"> <li>Reduction in Electricity Use</li> <li>Renewable Energy in Public Way</li> </ul>	<p><b>CA</b> <b>Climate + Air Quality</b></p> <ul style="list-style-type: none"> <li>Contractor Fleet Using Alternative Energy</li> <li>Alternative Fueling Stations Installed</li> </ul>	<p><b>C</b> <b>Commissioning</b></p> <ul style="list-style-type: none"> <li>Projects with Commissioning and Monitoring Plan</li> <li>Projects with a Maintenance Plan</li> </ul>
<p><b>EC</b> <b>Economics</b></p> <ul style="list-style-type: none"> <li>Design Refinements Made Based on Sustainability Valuation</li> <li>Value Created for Chicago</li> </ul>	<p><b>BC</b> <b>Beauty + Community</b></p> <ul style="list-style-type: none"> <li>Projects with Noise Mitigation Plan</li> <li>Partnerships Made to Maximize Sustainability Outside the Public Way</li> <li>Projects with Stakeholder Involvement Plan</li> </ul>	<ul style="list-style-type: none"> <li>Design Adjustments Made Based on Stormwater Modeling</li> </ul>



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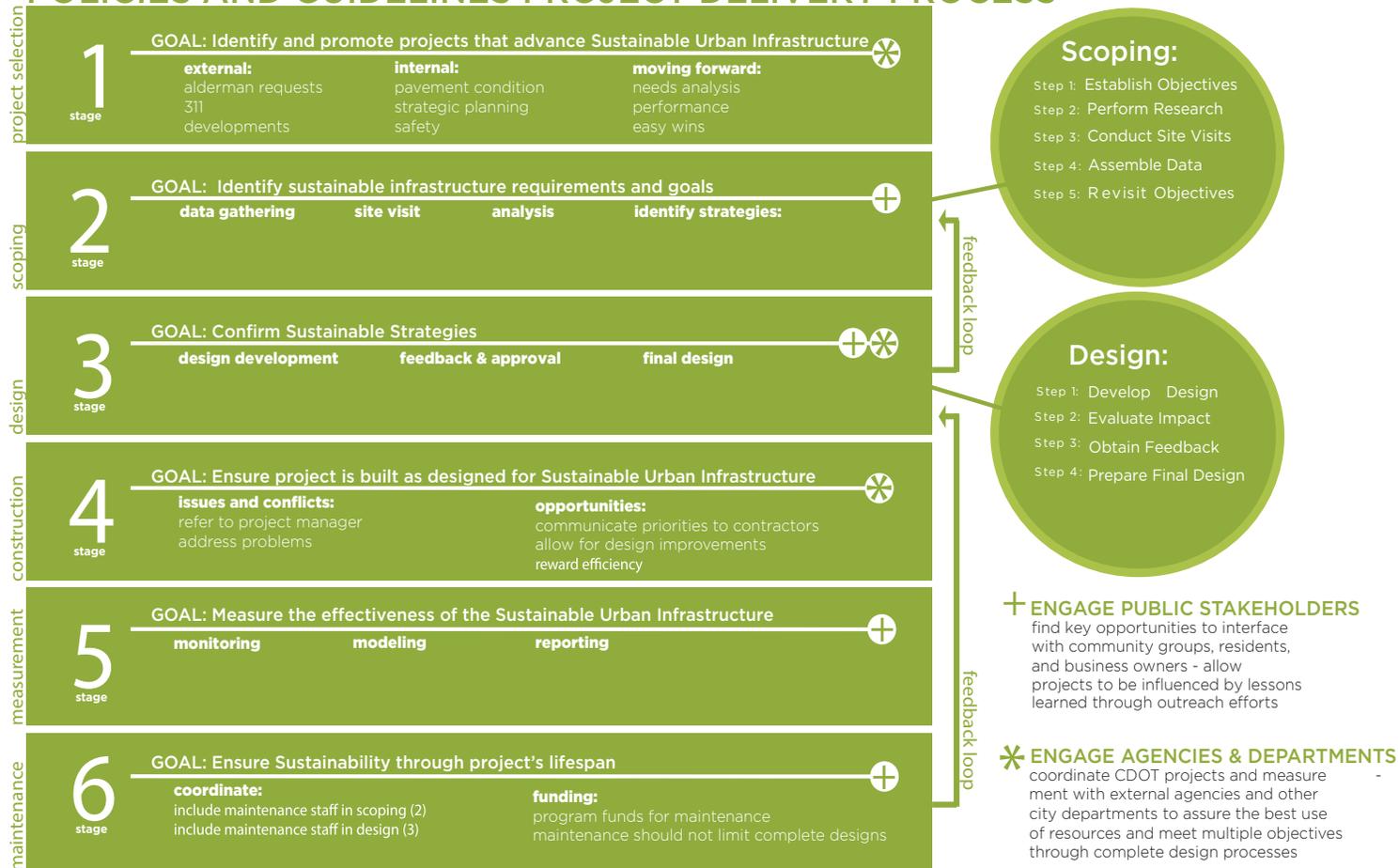
## 4.1 PROCESSES

### COMPLETE STREETS

The sustainable design goal setting and requirements identified in this document will be seamlessly woven into the project delivery process identified in the Complete Streets project delivery process.

#### Sustainable Infrastructure Process Diagram

### SUSTAINABLE URBAN INFRASTRUCTURE POLICIES AND GUIDELINES PROJECT DELIVERY PROCESS





*Bus Shelter - Financial Place and Congress Parkway*



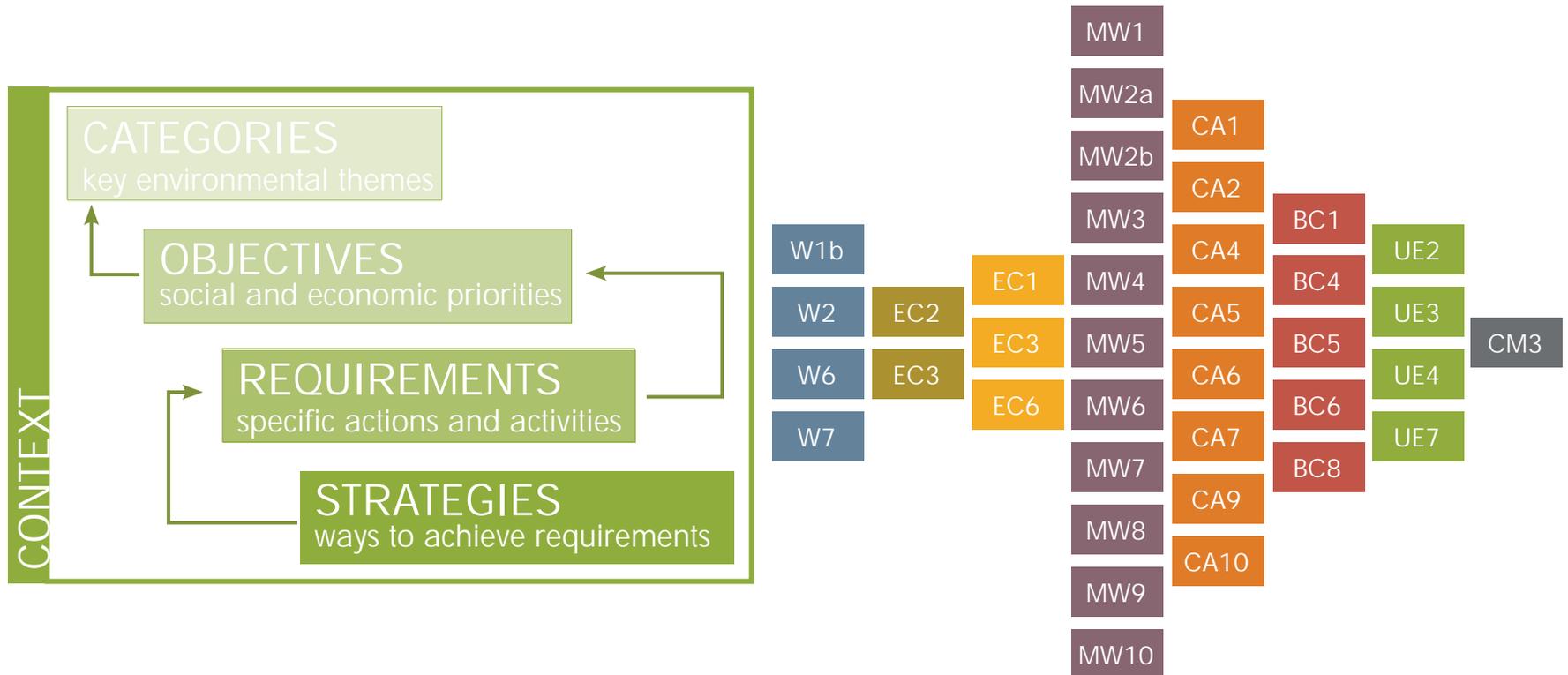
*Native Planter and Neighborhood Banner Identifier*



*Riverfront Bike Trail*

## 4.2 MATRICES

Project managers want to understand at a glance what requirements apply to their project to quickly assess whether their scope and budget can accommodate these actions. The matrices in this section show how the requirements, organized by category, apply (or do not!) to each CDOT program area. The table below identifies the trial requirements by project type for sister departments, agencies, utilities, and private developers who work in the public way. Prior to formally adopting these requirements, CDOT will perform pilot studies with these organizations, incorporating their feedback and lessons learned before finalizing a mandatory set of requirements



**TABLE 1: WATER REQUIREMENT MATRIX**

CDOT Project Type	W1a	W1b	W2	W3	W4	W5	W6	W7	W8	W9	W10					
Signal																
Red Light Running Cameras																
Signage & Pavement Marking Improvements																
Lighting Projects																
Tree Planting and Landscape		X	X				X	X	X	X	X					
ADA Ramp Improvements							X	X								
Pedestrian Safety Infrastructure Improvements							X	X	X							
Resurfacing		X	X				X	X	X							
Bike Facility Projects							X	X	X							
Bridge Repair including Painting (not replacement)							X	X								
Sidewalk and Miscellaneous Concrete Projects		X	X				X	X								
Vertical Clearance Improvements		X	X	X	X	X	X	X	X							
Landscaped Median Improvements		X	X			X	X	X	X		X					
Traffic Calming		X	X			X	X	X	X							
Transit Projects (BRT and Stations)		X	X	X	X	X	X	X	X	X	X					
City Funded Capital Projects		X	X			X	X	X	X	X	X					
CREATE/Rail Projects		X	X	X	X	X	X	X	X	X	X					
Alley Improvements	X		X	X	X	X	X	X								
Streetscape Projects	X		X	X	X	X	X	X	X	X	X					
Federal Aid Capital Projects (Highways)	X		X	X	X	X	X	X	X	X	X					
WPA/Industrial Streets	X		X	X	X	X	X	X	X	X	X					
Bike Stations		X	X	X	X	X	X	X	X	X	X					
Major Roadway Realignment	X		X	X	X	X	X	X	X	X	X					
Major Roadway Reconstruction	X		X	X	X	X	X	X	X	X	X					
Bridges (Replacement and New)	X		X	X	X	X	X	X	X	X	X					
Riverwalk	X		X	X	X	X	X	X	X	X	X					
Pedestrian Safety Zone		X	X				X	X								

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**TABLE 2: ENERGY REQUIREMENT MATRIX**

CDOT Project Type	EN1	EN2	EN3	EN4	EN5	EN6	EN7										
Signal			X			X											
Red Light Running Cameras			X			X											
Signage & Pavement Marking Improvements																	
Lighting Projects	X	X		X	X	X											
Tree Planting and Landscape																	
ADA Ramp Improvements																	
Pedestrian Safety Infrastructure Improvements			X			X											
Resurfacing						X											
Bike Facility Projects			X			X											
Bridge Repair including Painting (not replacement)						X											
Sidewalk and Miscellaneous Concrete Projects																	
Vertical Clearance Improvements	X	X	X	X	X	X											
Landscaped Median Improvements						X											
Traffic Calming																	
Transit Projects (BRT and Stations)	X	X	X	X	X	X	X										
City Funded Capital Projects	X	X	X	X	X	X											
CREATE/Rail Projects	X	X	X	X	X												
Alley Improvements	X	X		X	X												
Streetscape Projects	X	X	X	X	X	X											
Federal Aid Capital Projects (Highways)	X	X	X	X	X	X											
WPA/Industrial Streets	X	X	X	X	X	X											
Bike Stations	X			X		X											
Major Roadway Realignment	X	X	X	X	X	X											
Major Roadway Reconstruction	X	X	X	X	X	X											
Bridges (Replacement and New)	X	X	X	X	X	X											
Riverwalk	X	X		X	X	X											
Pedestrian Safety Zone			X			X											

**TABLE 3: ECONOMICS REQUIREMENT MATRIX**

CDOT Project Type	EC1	EC2	EC3														
Signal		X	X														
Red Light Running Cameras			X														
Signage & Pavement Marking Improvements			X														
Lighting Projects		X	X														
Tree Planting and Landscape			X														
ADA Ramp Improvements			X														
Pedestrian Safety Infrastructure Improvements		X	X														
Resurfacing		X	X														
Bike Facility Projects		X	X														
Bridge Repair including Painting (not replacement)		X	X														
Sidewalk and Miscellaneous Concrete Projects			X														
Vertical Clearance Improvements	X	X	X														
Landscaped Median Improvements		X	X														
Traffic Calming		X	X														
Transit Projects (BRT and Stations)	X	X	X														
City Funded Capital Projects	X	X	X														
CREATE/Rail Projects	X	X	X														
Alley Improvements		X	X														
Streetscape Projects		X	X														
Federal Aid Capital Projects (Highways)	X	X	X														
WPA/Industrial Streets		X	X														
Bike Stations		X	X														
Major Roadway Realignment	X	X	X														
Major Roadway Reconstruction	X	X	X														
Bridges (Replacement and New)	X	X	X														
Riverwalk	X	X	X														
Pedestrian Safety Zone		X	X														

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**TABLE 4: MATERIALS & WASTE REQUIREMENT MATRIX**

CDOT Project Type	MW1	MW2a	MW2b	MW3	MW4	MW6	MW7	MW8	MW10	MW11				
Signal	X	X	X	X	X		X	X	X					
Red Light Running Cameras					X		X		X					
Signage & Pavement Marking Improvements	X													
Lighting Projects	X	X	X	X	X		X	X	X					
Tree Planting and Landscape	X					X				X				
ADA Ramp Improvements	X	X	X	X	X					X				
Pedestrian Safety Infrastructure Improvements	X	X	X	X	X		X	X		X				
Resurfacing	X	X	X	X	X	X	X	X		X				
Bike Facility Projects	X	X	X	X	X		X	X		X				
Bridge Repair including Painting (not replacement)	X		X	X	X		X	X	X	X				
Sidewalk and Miscellaneous Concrete Projects	X	X	X		X		X			X				
Vertical Clearance Improvements	X	X	X	X	X	X	X	X	X	X				
Landscaped Median Improvements	X			X	X	X	X	X		X				
Traffic Calming	X	X	X	X	X	X	X	X		X				
Transit Projects (BRT and Stations)	X	X	X	X	X			X	X	X				
City Funded Capital Projects	X	X	X	X	X	X	X	X	X	X				
CREATE/Rail Projects														
Alley Improvements	X	X	X	X	X		X	X		X				
Streetscape Projects	X	X	X	X	X	X	X	X	X	X				
Federal Aid Capital Projects (Highways)	X	X	X	X	X	X	X	X	X	X				
WPA/Industrial Streets	X	X	X	X	X	X	X	X	X	X				
Bike Stations	X	X	X							X				
Major Roadway Realignment	X	X	X	X	X	X	X	X	X	X				
Major Roadway Reconstruction	X	X	X	X	X	X	X	X	X	X				
Bridges (Replacement and New)	X	X	X	X	X	X	X	X	X	X				
Riverwalk	X	X	X	X	X	X	X	X	X	X				
Pedestrian Safety Zone		X	X	X	X		X	X		X				

**TABLE 5: CLIMATE AND AIR QUALITY REQUIREMENT MATRIX**

CDOT Project Type	CA1	CA2	CA3	CA4	CA5	CA6	CA7	CA8	CA9	CA10						
Signal	X	X		X		X	X	X	X	X						
Red Light Running Cameras	X	X		X		X	X			X						
Signage & Pavement Marking Improvements	X	X		X		X	X		X	X						
Lighting Projects	X	X		X		X	X		X	X						
Tree Planting and Landscape	X	X		X		X	X		X	X						
ADA Ramp Improvements	X	X		X		X	X		X	X						
Pedestrian Safety Infrastructure Improvements	X	X		X		X	X		X	X						
Resurfacing	X	X		X		X	X		X	X						
Bike Facility Projects	X	X		X		X	X	X	X	X						
Bridge Repair including Painting (not replacement)	X	X		X		X	X		X	X						
Sidewalk and Miscellaneous Concrete Projects	X	X		X		X	X		X	X						
Vertical Clearance Improvements	X	X		X		X	X		X	X						
Landscaped Median Improvements	X	X		X		X	X		X	X						
Traffic Calming	X	X		X		X	X		X	X						
Transit Projects (BRT and Stations)	X	X	X	X	X	X	X	X	X	X						
City Funded Capital Projects	X	X	X	X		X	X	X	X	X						
CREATE/Rail Projects				X		X	X	X	X	X						
Alley Improvements	X	X		X		X	X		X	X						
Streetscape Projects	X	X	X	X		X	X	X	X	X						
Federal Aid Capital Projects (Highways)	X	X	X	X	X	X	X	X	X	X						
WPA/Industrial Streets	X	X	X	X		X	X		X	X						
Bike Stations	X	X	X	X	X	X	X									
Major Roadway Realignment	X	X	X	X	X	X	X	X	X	X						
Major Roadway Reconstruction	X	X	X	X	X	X	X	X	X	X						
Bridges (Replacement and New)	X	X		X	X	X	X		X	X						
Riverwalk	X	X		X	X	X	X		X	X						
Pedestrian Safety Zone	X	X		X		X	X		X	X						

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**TABLE 7: BEAUTY AND COMMUNITY REQUIREMENT MATRIX**

CDOT Project Type	BC1	BC2	BC3	BC4	BC5	BC6	BC7	BC8							
Signal															
Red Light Running Cameras															
Signage & Pavement Marking Improvements															
Lighting Projects				X	X										
Tree Planting and Landscape	X														
ADA Ramp Improvements															
Pedestrian Safety Infrastructure Improvements				X	X										
Resurfacing					X										
Bike Facility Projects			X	X											
Bridge Repair including Painting (not replacement)					X										
Sidewalk and Miscellaneous Concrete Projects				X	X										
Vertical Clearance Improvements			X	X	X	X	X	X							
Landscaped Median Improvements	X		X	X	X		X	X							
Traffic Calming	X			X	X										
Transit Projects (BRT and Stations)	X		X	X	X	X	X	X							
City Funded Capital Projects	X		X	X	X	X	X	X							
CREATE/Rail Projects				X	X	X									
Alley Improvements	X			X	X										
Streetscape Projects	X	X	X	X	X	X	X	X							
Federal Aid Capital Projects (Highways)	X	X	X	X	X	X	X	X							
WPA/Industrial Streets	X		X	X	X	X		X							
Bike Stations	X			X	X	X	X	X							
Major Roadway Realignment	X	X	X	X	X	X	X	X							
Major Roadway Reconstruction	X	X	X	X	X	X	X	X							
Bridges (Replacement and New)	X		X	X	X	X	X	X							
Riverwalk	X		X	X	X	X	X	X							
Pedestrian Safety Zone				X	X	X		X							

**TABLE 6: URBAN ECOLOGY REQUIREMENT MATRIX**

CDOT Project Type	UE1	UE2	UE3	UE4	UE5	UE6	UE7							
Signal														
Red Light Running Cameras														
Signage & Pavement Marking Improvements														
Lighting Projects														
Tree Planting and Landscape	X	X	X	X			X							
ADA Ramp Improvements														
Pedestrian Safety Infrastructure Improvements		X	X	X			X							
Resurfacing	X	X	X	X		X	X							
Bike Facility Projects	X	X	X	X			X							
Bridge Repair including Painting (not replacement)					X									
Sidewalk and Miscellaneous Concrete Projects		X	X	X			X							
Vertical Clearance Improvements	X	X	X	X		X	X							
Landscaped Median Improvements			X	X		X	X							
Traffic Calming		X	X	X			X							
Transit Projects (BRT and Stations)	X	X	X	X		X	X							
City Funded Capital Projects	X	X	X	X	X	X	X							
CREATE/Rail Projects	X	X	X	X	X	X	X							
Alley Improvements														
Streetscape Projects	X	X	X	X	X	X	X							
Federal Aid Capital Projects (Highways)	X	X	X	X	X	X	X							
WPA/Industrial Streets	X	X	X	X	X	X	X							
Bike Stations	X	X	X	X			X							
Major Roadway Realignment	X	X	X	X	X	X	X							
Major Roadway Reconstruction	X	X	X	X	X	X	X							
Bridges (Replacement and New)	X	X	X	X	X	X	X							
Riverwalk	X	X	X	X	X	X	X							
Pedestrian Safety Zone		X	X	X			X							

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**TABLE 8: COMMISSIONING REQUIREMENT MATRIX**

CDOT Project Type	CM1	CM2	CM3	CM4	CM5													
Signal			X															
Red Light Running Cameras			X															
Signage & Pavement Marking Improvements			X															
Lighting Projects		X	X	X														
Tree Planting and Landscape		X	X	X														
ADA Ramp Improvements			X															
Pedestrian Safety Infrastructure Improvements			X															
Resurfacing			X															
Bike Facility Projects		X	X	X														
Bridge Repair including Painting (not replacement)			X															
Sidewalk and Miscellaneous Concrete Projects			X															
Vertical Clearance Improvements	X		X															
Landscaped Median Improvements		X	X	X														
Traffic Calming			X															
Transit Projects (BRT and Stations)		X	X	X	X													
City Funded Capital Projects	X	X	X	X	X													
CREATE/Rail Projects			X															
Alley Improvements		X	X	X														
Streetscape Projects	X	X	X	X	X													
Federal Aid Capital Projects (Highways)	X	X	X	X	X													
WPA/Industrial Streets	X	X	X	X														
Bike Stations		X	X	X	X													
Major Roadway Realignment	X	X	X	X	X													
Major Roadway Reconstruction	X	X	X	X	X													
Bridges (Replacement and New)			X															
Riverwalk		X	X	X	X													
Pedestrian Safety Zone			X															



## 4.3 WORKSHEETS

### DESIGN CHECKLIST

This document is an organizing tool for designers to document their consideration and selection of the requirements appropriate for their project. It allows the diversity of requirements to be summarized neatly on one page and provide, at a glance, the sustainability elements the project will focus on.

Project Number	Project Name
<b>CONCEPTUAL DESIGN (&lt; 10 percent design)</b>	
1. Identify the CDOT function that best applies to your project from the list to the right.	<input type="checkbox"/> Signal <input type="checkbox"/> Red Light Running Cameras <input type="checkbox"/> Signage & Pavement Markings <input type="checkbox"/> Lighting Projects <input type="checkbox"/> Tree Planting <input type="checkbox"/> ADA Ramp <input type="checkbox"/> Pedestrian Safety <input type="checkbox"/> Arterial Resurfacing <input type="checkbox"/> Bike Facility (primarily striping) <input type="checkbox"/> Bridge Repair (not replace) <input type="checkbox"/> Sidewalk/Misc Concrete <input type="checkbox"/> Vertical Clearance <input type="checkbox"/> Landscaped Median <input type="checkbox"/> Traffic Calming <input type="checkbox"/> Transit Projects (BRT) <input type="checkbox"/> Alley Improvements <input type="checkbox"/> City-funded Capital Projects <input type="checkbox"/> CREATE/rail projects <input type="checkbox"/> Streetscape <input type="checkbox"/> Federal Aid Capital Projects <input type="checkbox"/> WPA/Industrial Streets <input type="checkbox"/> Bike Stations <input type="checkbox"/> Major Roadway Alignment <input type="checkbox"/> Major Roadway Reconstruction <input type="checkbox"/> Bridge Replacement <input type="checkbox"/> Riverwalk <input type="checkbox"/> Pedestrian Safety Zone
2. From Table 2, which WATER requirements apply to your project type?	<input type="checkbox"/> W1a or <input type="checkbox"/> W1b <input type="checkbox"/> W2 <input type="checkbox"/> W3 <input type="checkbox"/> W4 <input type="checkbox"/> W5 <input type="checkbox"/> W6 <input type="checkbox"/> W7 <input type="checkbox"/> W8 <input type="checkbox"/> W9 <input type="checkbox"/> W10
3. From Table 3, which ENERGY requirements apply to your project type?	<input type="checkbox"/> EN1 <input type="checkbox"/> EN2 <input type="checkbox"/> EN3 <input type="checkbox"/> EN4 <input type="checkbox"/> EN5 <input type="checkbox"/> EN6 <input type="checkbox"/> EN7
4. From Table 4, which ECONOMICS requirements apply to your project type?	<input type="checkbox"/> EC1 <input type="checkbox"/> EC2 <input type="checkbox"/> EC3
5. From Table 5, which MATERIALS & WASTE requirements apply to your project type?	<input type="checkbox"/> MW1 <input type="checkbox"/> MW2a or <input type="checkbox"/> W2b <input type="checkbox"/> MW3 <input type="checkbox"/> MW4 <input type="checkbox"/> MW5 <input type="checkbox"/> MW6 <input type="checkbox"/> MW7 <input type="checkbox"/> MW8 <input type="checkbox"/> MW9 <input type="checkbox"/> MW10 <input type="checkbox"/> MW11
6. From Table 6, which CLIMATE & AIR QUALITY requirements apply to your project type?	<input type="checkbox"/> CA1 <input type="checkbox"/> CA2 <input type="checkbox"/> CA3 <input type="checkbox"/> CA4 <input type="checkbox"/> CA5 <input type="checkbox"/> CA6 <input type="checkbox"/> CA7 <input type="checkbox"/> CA8 <input type="checkbox"/> CA9 <input type="checkbox"/> CA10
7. From Table 7, which URBAN ECOLOGY requirements apply to your project type?	<input type="checkbox"/> UE1 <input type="checkbox"/> UE2 <input type="checkbox"/> UE3 <input type="checkbox"/> UE4 <input type="checkbox"/> UE5 <input type="checkbox"/> UE6 <input type="checkbox"/> UE7
8. From Table 8, which BEAUTY AND COMMUNITY requirements apply to your project type?	<input type="checkbox"/> BC1 <input type="checkbox"/> BC2 <input type="checkbox"/> BC3 <input type="checkbox"/> BC4 <input type="checkbox"/> BC5 <input type="checkbox"/> BC6 <input type="checkbox"/> BC7 <input type="checkbox"/> BC8 <input type="checkbox"/> BC9
9. From Table 9, which COMMISSIONING requirements apply to your project type?	<input type="checkbox"/> CM1 <input type="checkbox"/> CM2 <input type="checkbox"/> CM3 <input type="checkbox"/> CM4 <input type="checkbox"/> CM5
10. Refer to the project requirements matrix for full description of each applicable requirement	
11. Identify the types of data needed for your project from the data matrix.	

## IMPLEMENTATION CHECKLIST

This document lives with the project documentation, providing a record as the project advances of which sustainability requirements were attempted, and how those were finally achieved.

Project Number	Project Name				Project Manager		
<b>REVIEW ITEMS</b>							
<b>A. INITIATION &amp; SCOPING</b>				<b>Yes</b>	<b>No<sup>(1)</sup></b>	<b>N/A</b>	<b>REMARKS</b>
1. Does this project promote sustainability							
2. Did the project team evaluate potential synergies with nearby CDOT and Water Dept. projects?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Did the project team coordinate with utility agencies to avoid construction inefficiencies?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Did the project team consider partnering with nearby community groups and adjacent property owners to maximize co-benefits?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>B. CONCEPTUAL DESIGN (to be completed after 10% design)</b>				<b>Yes</b>	<b>No<sup>(1)</sup></b>	<b>N/A</b>	<b>REMARKS</b>
1. Has the project team identified the applicable requirements and appropriate data needs for the project?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Has the project team identified preliminary strategies to meet the requirements?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Does the conceptual design for the project meet all the requirements from the SUI Manual?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Additional info:</b>							
<b>C. DESIGN DEVELOPMENT</b>				<b>Yes</b>	<b>No<sup>(1)</sup></b>	<b>N/A</b>	<b>REMARKS</b>
1. Has the project team collected all applicable data to design sustainable strategies (i.e. percolation tests)?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Has the project team incorporated sustainable strategies from Volume II of the Manual to meet the applicable requirements?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Does the preliminary design for the project meet all the requirements from the Sustainable Urban Infrastructure Manual?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Are there liquidated damages in the contract associated with the sustainable requirements?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Do the contract documents require the contractor to track the installation of sustainable components?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Additional info:</b>							
<b>D. Construction, Maintenance &amp; Performance</b>							
1. Have the sustainable elements been installed per plans?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Has the project team coordinated with local community groups to maintain streetscape?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Have special commissioning or maintenance needs been identified? If so, what are they?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Did the project follow the Erosion and Sediment Control Plan?				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Additional info:</b>							

## 4.4 ILLUSTRATIVE SCENARIOS

This document proposes a change in our understanding of what infrastructure can achieve, and is illustrated in the cross-sections in this section.

The designer needs to keep the specifics of the site in mind as they explore which best practices to attempt. For example, having a project in a sewer or flood-sensitive area increases the need for flood control and stormwater management techniques. Proximity to a landmark park or natural area will influence the design of stormwater techniques, plant selection, and location, as well as lighting type and location. In every case, which techniques are used should relate specifically to the underlying environmental conditions as well as surrounding land use and planned development. As these cross sections illustrate, typology influences how and which best practices are implemented.

### PHILOSOPHY OF THE SPECTRUM OF APPLICATION:

#### KEY PRINCIPLES

**Don't put it back the same way.** This a new day for Chicago—a day in which we will not keep putting back 19th- or even 20th-century technologies in our streets, but instead will be implementing features that will enhance the performance of the streets, turning them from a liability to highly performing infrastructure in the city. Chicago's streets will not only move people through the city but will improve the environment and provide better-quality places for residents and businesses.

**One size does not fit all.** Street types and adjacent uses vary widely across the city. The appropriate design will be developed once an understanding of the users and specific site conditions and needs are understood. A series of questions and list of resources are provided within the checklist/process.

**Green infrastructure is not an option; it is an integral part of CDOT's work and will be folded into every project.** Implementation of green infrastructure will most often be of a surgical manner on the wide range of individual projects CDOT carries out every day. In addition to satisfying the need of that specific work order, designers will find ways to implement green infrastructure. While reconstruction of the full-street right-of-way offers the optimal situation for implementation, it is not always possible. However, something can be done on every project.

## ILLUSTRATIVE SCENARIOS

The vision for Chicago's street infrastructure builds on the key principles above. The key to long-term implementation lies in keeping a strong vision while finding opportunities to implement projects at a range of scales across the city that will cumulatively create a strong green infrastructure throughout Chicago's streets.

A key part of the design approach advocated in these guidelines is to identify within each typology those elements to be redesigned or enhanced for environmental performance. It is these elements that receive technical attention within the design manual (Volume 2). For example, a bumpout can be implemented and designed to accept and filter stormwater from the street. A utility cut to replace a water main can be backfilled with gravel and paved with permeable pavers to infiltrate water from the roadway. These methods of redesigning the street through the discreet elements in the right-of-way will cumulatively begin to address the environmental challenges we face relative to stormwater, energy usage, urban heat island, and so on.



Chicago Department of Transportation



July 2013

Full reconstruction of the right-of-way from building to building provides the best opportunity for implementing the full spectrum of sustainability practices: Those that will achieve all environmental goals while supporting neighborhood quality and economic development. This vision comprises all possible elements a street is capable of including to be a great street—from accommodating safer travel to developing tree canopy and infiltrating water to closing the loop on materials and energy usage. Achieving these goals lies in identifying opportunities within each CDOT project to have an environmental effect (e.g., replacing impervious pavement with pervious; developing better soils for our street trees; providing bumpouts and refuge islands for pedestrian safety that also serve to infiltrate water). Each project can put something back that performs better in the short and long term.

### EXAMPLE 1 : NEIGHBORHOOD/RESIDENTIAL STREET, 66-FOOT RIGHT-OF-WAY

Chicago is a residential and very livable city, with neighborhoods that are characterized by a local character and a vibrant culture. Residential streets comprise a great percentage of the streets in Chicago. The opportunities to implement green infrastructure design in residential streets is high since overall traffic volumes are lower and there is often more space within the right-of-way to design ecological features such as stormwater and planting features.

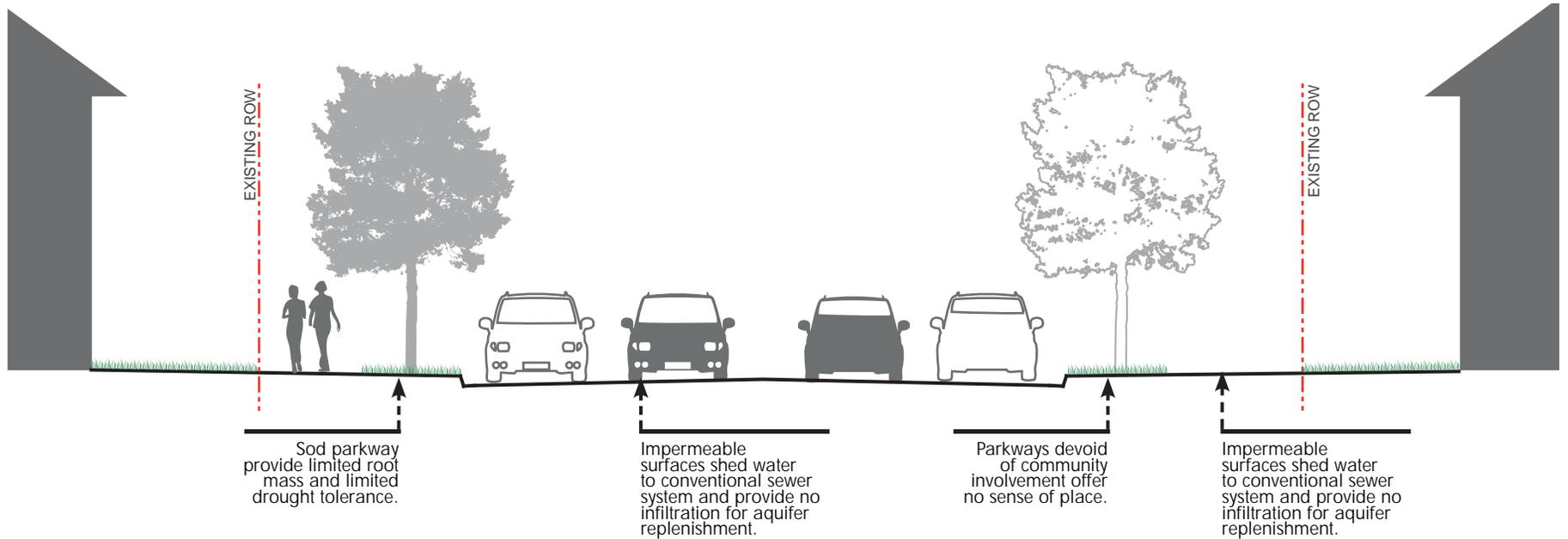
The example of a 66-foot right-of-way is in a residential context. The section shows a full reconstruction wherein all sections (travelway, interstitial/eco-zone, and sidewalk zone) are redesigned for ecological purposes that improve the character and quality of the street

#### Requirements of the project:

1. Capture, store, and infiltrate stormwater (W1A, W2, W5, W6, W8)
2. Increase planting mass and urban ecological performance and quality for the neighborhood (BC4, UE1, UE2, UE3, UE4, UE6, UE9)
3. Accommodate cyclists safely in the roadway
4. Reduce urban heat island effect and improve air quality (MW6, MW7, MW10)
5. Maximize the use of local and recycled materials (MW2, MW11)
6. Minimize energy use through efficient lighting (EN1, EN2, EN3, EN4, EN7, EN8)
7. Monitor the performance of the project (CM1, CM2, CM3, CM4)

#### The design does this by:

1. Enhancing parkway planters as bioswales to increase tree canopy and shrub layer at the ground plane.
2. Replacing adjacent pavements in the sidewalk and parking lane and using structural soil in the subgrade to infiltrate water and expand the root-zone area.
3. Providing bumpouts where possible to increase planting density and infiltration area, and thus shortening street-crossing distance for pedestrians.
4. Shedding water from the travelway to these infiltration areas.
5. Situating benches and other neighborhood markers logically to enhance a sense of place.
6. Using recycled aggregates and water in the pavement.
7. Using lamps that meet Illuminating Engineering Society (IES) standards and using fixtures that eliminate glare and bleed.
8. Employing sensors to monitor pavement performance.



**NEIGHBORHOOD STREET - BEFORE**



**NEIGHBORHOOD STREET - BEFORE**

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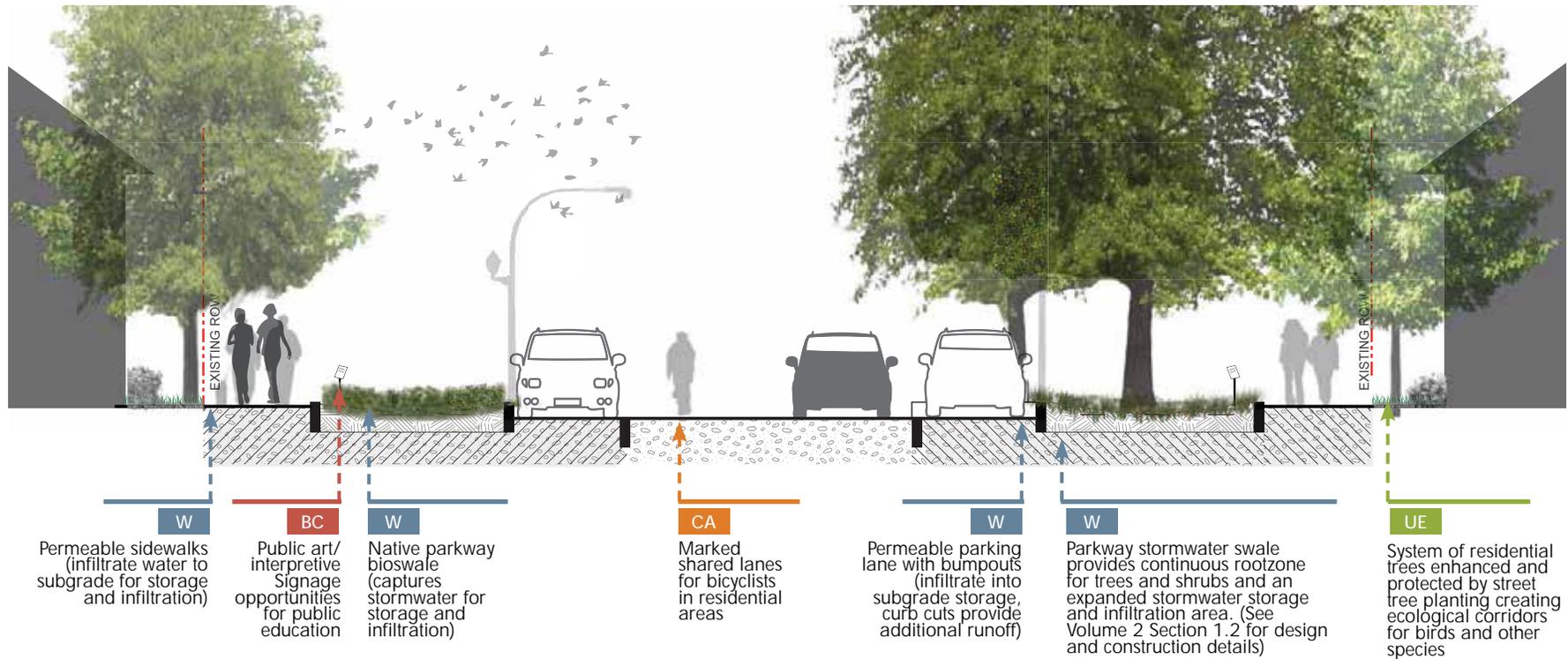
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**EXAMPLE 1 : NEIGHBORHOOD/ RESIDENTIAL STREET, 66 FOOT RIGHT-OF-WAY**



- W Native parkway bioswale (captures stormwater for storage and infiltration)
- BC Public art/ interpretive signage opportunities for public education
- CA Marked shared lanes for bicyclists in residential areas
- W Permeable parking lane with bumpouts (infiltrate into subgrade storage, curb cuts provide additional runoff)
- W Permeable sidewalks (infiltrate water to subgrade for storage and infiltration)



**NEIGHBORHOOD / RESIDENTIAL STREET - AFTER**



*Infiltration Planter at Herring Run*



*Infiltration Planter in Portland*



*Parkway Swale in Seattle*

**NEIGHBORHOOD / RESIDENTIAL STREET - PRECEDENTS**

**EXAMPLE 2 : MAIN/COMMERCIAL STREET, 80 FOOT RIGHT-OF-WAY**

Requirements apply to commercial streets, and the goals project managers select may not vary dramatically from those selected for neighborhood, corridor, or special district areas. However, space may be tighter because of travel demands and higher volume of users of the right-of-way, including the need to preserve pavements for sidewalk activities such as bus stops, cafes, or vendor space.

In a commercial application, stormwater infiltration and storage may need to be handled primarily through permeable pavements with gravel storage placed below grade. Permeable pavements adjacent to street tree plantings can be designed with structural soil that will allow for an expanded root zone. Developing a mature canopy is critical to reducing the urban heat island effect in a paved roadway. The shading and cooling provided by evapotranspiration will improve the quality of streets for people.

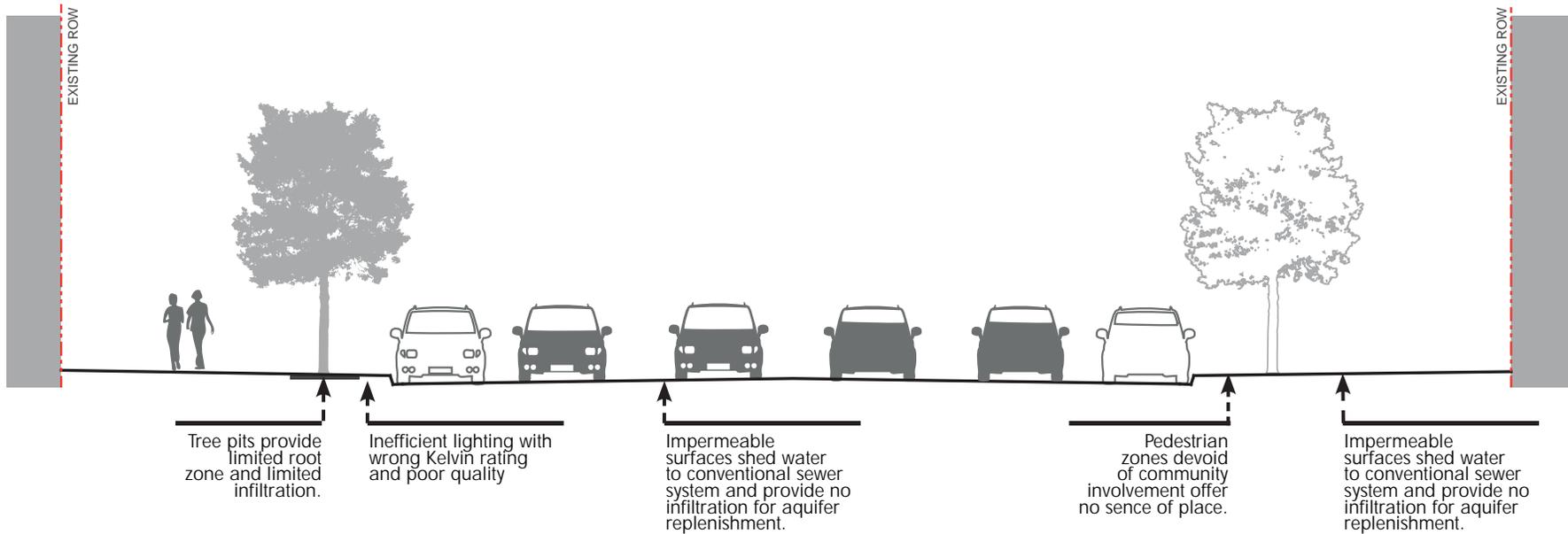
Commercial streets also present placemaking opportunities, reflecting neighborhood history and character and drawing pedestrians and cyclists into local shopping and services.

**Requirements of the project:**

1. Capture, store, and infiltrate stormwater (W1A, W2, W5, W6, W8)
2. Increase planting mass and urban ecological performance and quality for the neighborhood (BC4, UE1, UE2, UE3, UE4, UE6, UE9)
3. Accommodate cyclists safely in the roadway
4. Reduce urban heat island effect and improve air quality (MW6, MW7, MW10)
5. Maximize the use of local and recycled materials (MW2, MW11)
6. Minimize energy use through efficient lighting (EN1, EN2, EN3, EN4, EN7, EN8)
7. Monitor the performance of the project (CM1, CM2, CM3, CM4)

**The design does this by:**

1. Enhancing parkway planters as bioswales to increase tree canopy and shrub layer at the ground plane.
2. Replacing adjacent pavements in the sidewalk and parking lane and using structural soil in the subgrade to infiltrate water and expand the rootzone area.
3. Providing bumpouts where possible to increase planting density and infiltration area, and thus shortening street-crossing distance for pedestrians.
4. Shedding water from the travelway to these infiltration areas.
5. Situate benches and other neighborhood markers logically to enhance a sense of place.
6. Using recycled aggregates and water in the pavement.
7. Using lamps that meets IES standards and using fixtures that eliminate glare and bleed.
8. Employing sensors to monitor pavement performance.



**MAIN/COMMERCIAL STREET - BEFORE**



**MAIN/COMMERCIAL STREET - BEFORE**

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### EXAMPLE 2 : MAIN/COMMERCIAL STREET, 80 FOOT RIGHT-OF-WAY



**UE CM**  
Parkway planters with continuous root zones increase tree canopy

**UE W**  
Bumpouts to increase planting density and infiltration area

**W UE**  
Parkway planter (captures stormwater for storage and infiltration enhanced tree growth)

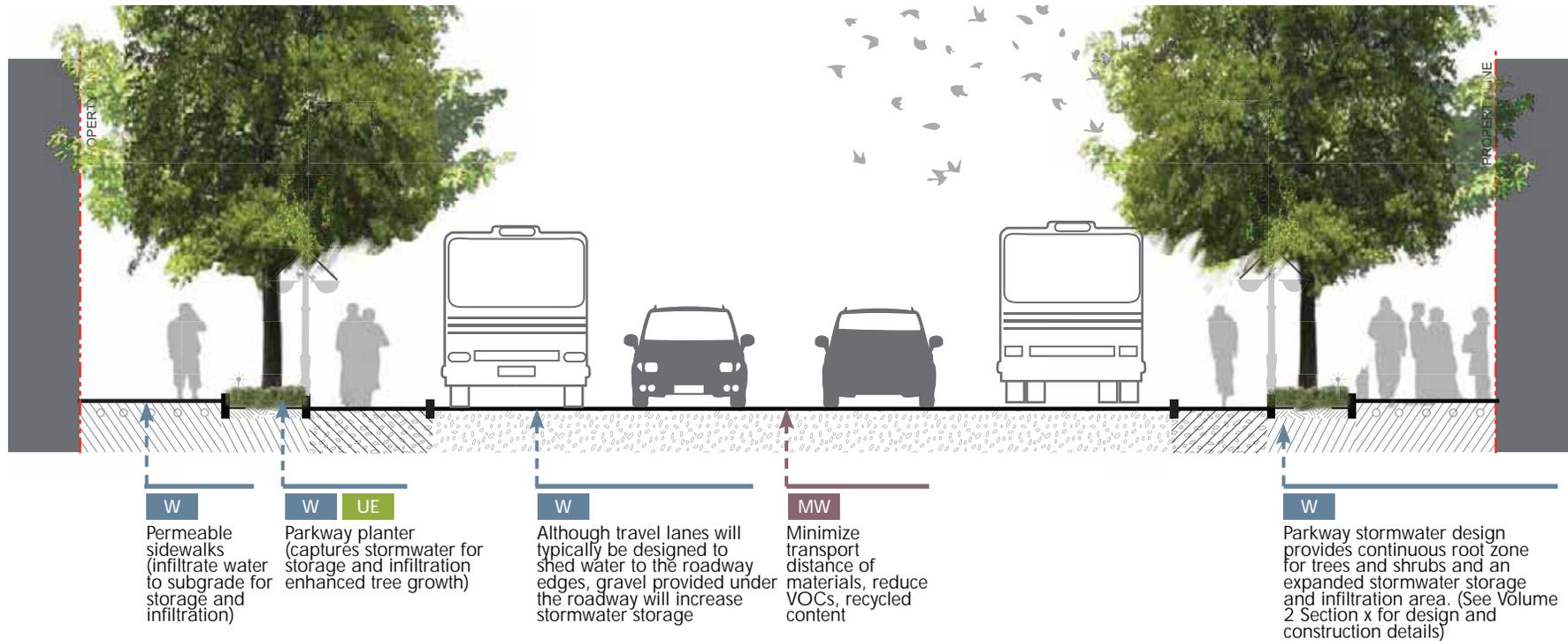
**W**  
Parkway stormwater design provides continuous root zone for trees and shrubs and an expanded stormwater storage and infiltration area. (See Volume 2 for design and construction details)

**W**  
Curb cuts to shed water from travelway to infiltration zones

**W**  
Permeable sidewalks (infiltrate water to subgrade for storage and infiltration)

**MW**  
Minimize transport distance of materials, reduce VOCs, recycled content

**W**  
Although travel lanes will typically be designed to shed water to the roadway edges, gravel provided under the roadway will increase stormwater storage



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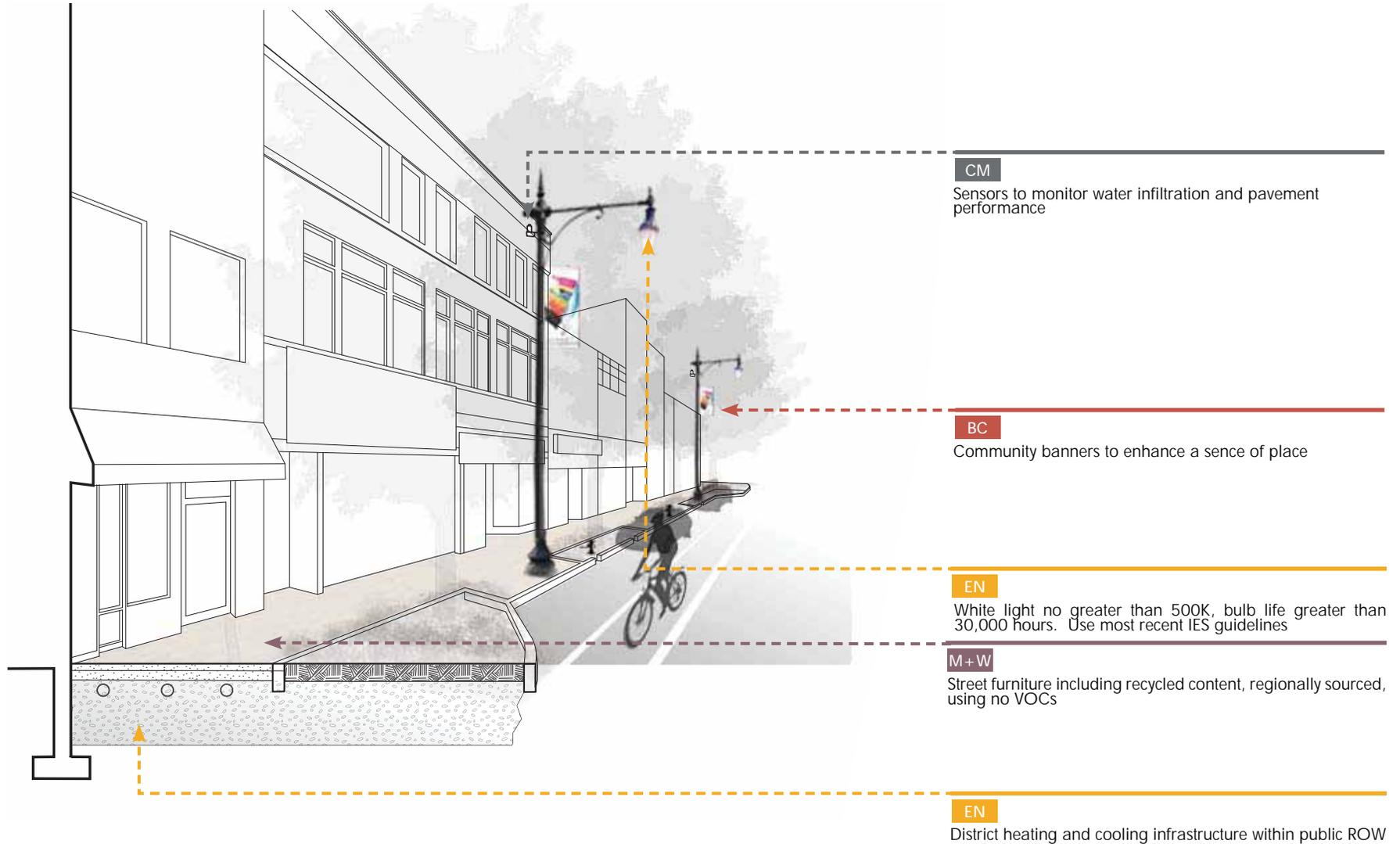


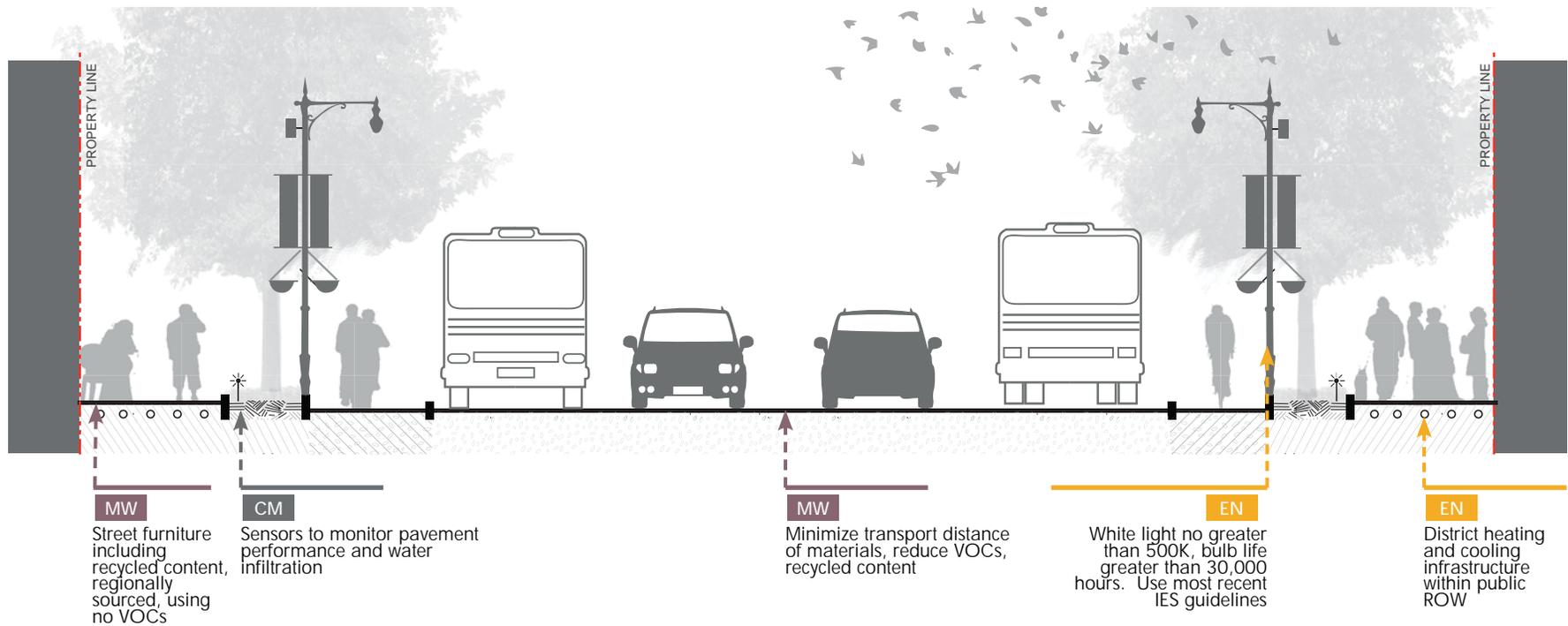
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**MAIN/COMMERCIAL STREET - PRECEDENTS**

### EXAMPLE 2 : MAIN/COMMERCIAL STREET, 80 FOOT RIGHT-OF-WAY



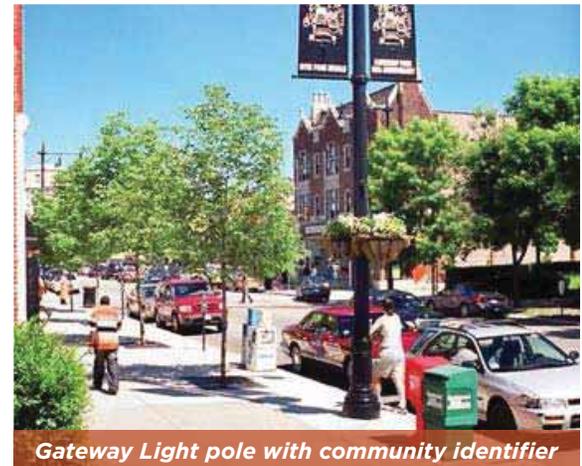
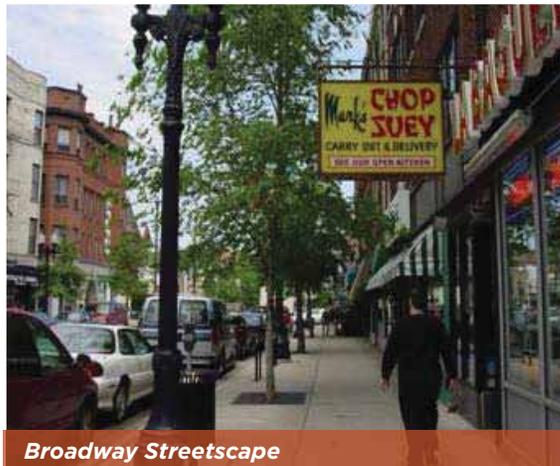


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**EXAMPLE 3 : THOROUGHFARE/MIXED-USE, 100' RIGHT-OF-WAY**

This example illustrates strategies tailored for a thoroughfare in a mixed land-use typology. The example illustrates a complete reconstruction, to which a wide set of requirements apply. The surrounding land use, though, informs the strategies will apply those requirements. Given the surrounding land use, which is a lower density mix of industrial, residential, and commercial uses, and the type of travel volume—more cars than pedestrians though with a bus rapid transit (BRT) stop—the application of strategies to meet the requirements will need to balance priorities.

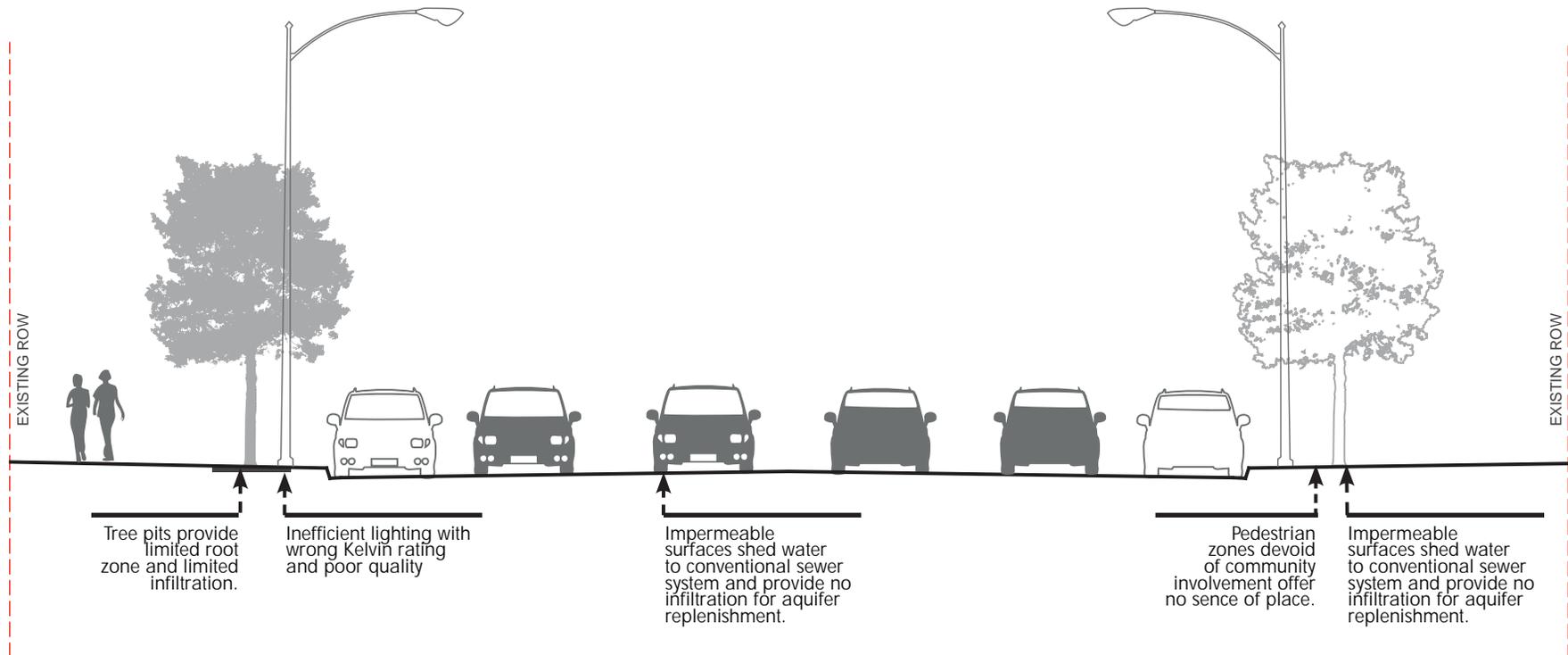
For example, soil data shows excellent soils, which indicates that a bioswale could be used effectively within the parkway, along with trees selected to tolerate bioswale conditions. Cool pavement strategies, including extensive tree planting in the sidewalk, will help to diminish the effect of the existing hot spot. The sidewalk realm also presents opportunities for placemaking and district identifiers at the BRT stop

Requirements of the project:

1. Capture stormwater and maximize infiltration (W1A, W2, W5, W6, W8)
2. Energy efficient lighting (EN1, EN2, EN3, EN4, EN7, EN8)
3. Sustainability Valuation applied (EC1)
4. Waste diversion during construction, and incorporation of cool pavement strategies and recycled materials (MW1, MW2, MW4, MW5, MW6, MW7, MW10, MW11)
5. Construction work follows requirements (CA1, CA2, CA4, CA5, CA6, CA7)
6. Increased plantings and trees (UE1, UE2, UE3, UE4, UE5, UE6, UE7, UE8, UE9)
7. Effective outreach, coordination, and education and incorporation of public art (PL4, PL5, PL6)
8. Commission special elements of the project, including permeable pavers, and monitor performance (CM1, CM2, CM3, CM4)

The design does this by:

1. Creating a bioswale median and increasing the infiltration area.
2. Creating a continuous tree pit, with appropriate crossing spaces, to enable tree canopy that enhances cool pavement strategies.
3. Replacing adjacent sidewalk pavements with permeable pavers and using structural soil in the subgrade to infiltrate water and expand the root zone area.
4. Shedding water from travelway into infiltration areas.
5. Using recycled aggregates in pavements, as well as high albedo pavement.
6. Using lamps that meet IES standards and using cut-off fixtures.
7. Installing sensors to monitor pavement performance.
8. Developing a monitoring plan with adjacent property owners to maintain tree pits.
9. Using high albedo pavement in travelway, including the BRT running in outside lanes.
10. Incorporation of living walls into BRT shelter, and photovoltaics into the canopy.
11. Identifying locations for public art and education opportunities.



**THOROUGHFARE STREET - BEFORE**



**THOROUGHFARE STREET - BEFORE**

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**EXAMPLE 1 : THOROUGHFARE/MIXED-USE, 100' RIGHT-OF-WAY**



UE

Maximize plantings and tree canopy

BC

Effective outreach, coordination, and education

EN

Photovoltaics on bus canopies provide renewable energy source

UE

Maximize plantings and tree canopy

MW

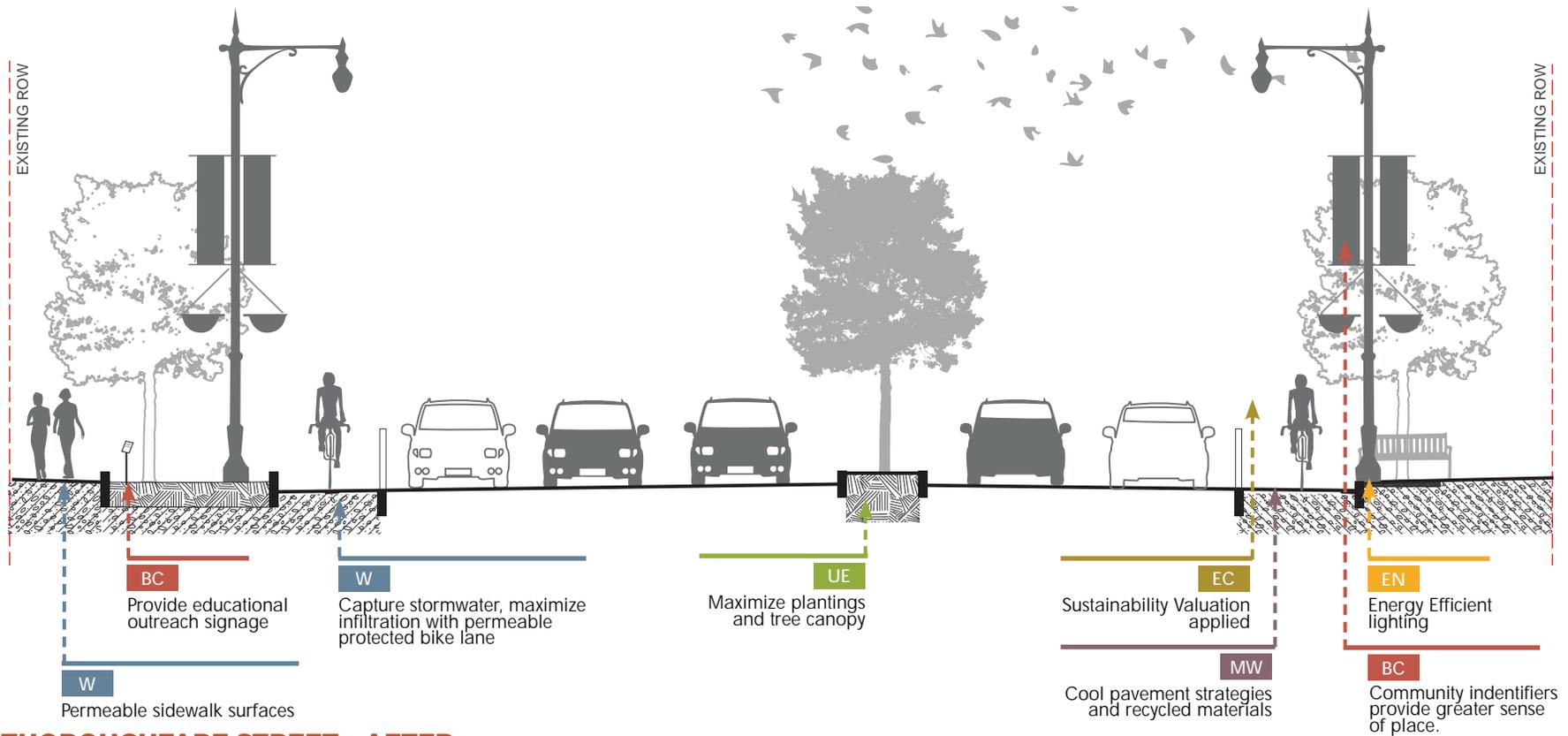
Cool pavement strategies and recycled materials

W

Capture stormwater, maximize infiltration

W

Permeable protected bike lane and sidewalk surfaces



**THOROUGHFARE STREET - AFTER**



*Educational signage - Maplewood and Diversey*



*Curb Cut - Maxwell Street Market*



*Infiltration Planter - Pilsen*

**THOROUGHFARE STREET - PRECEDENTS**

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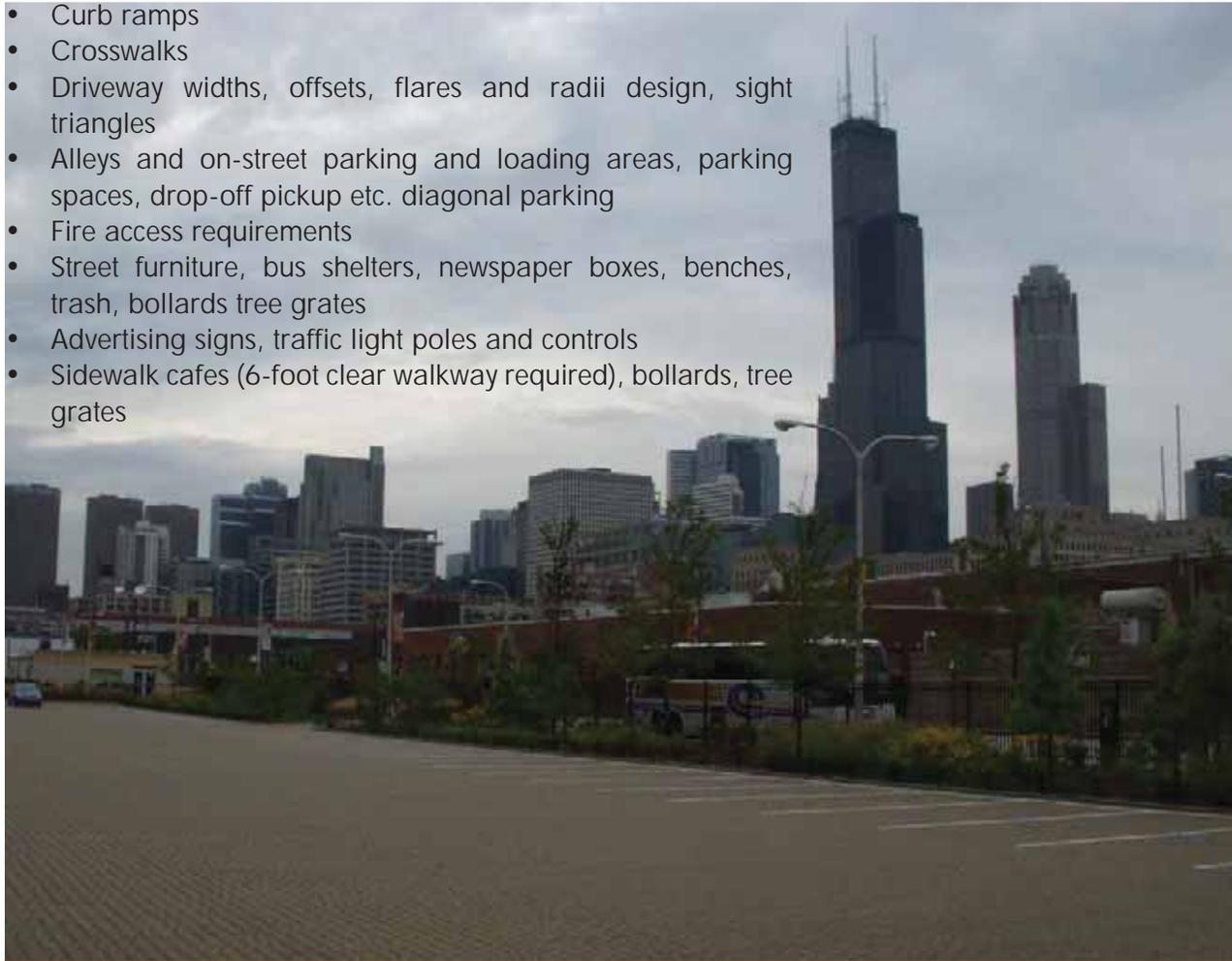
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## OTHER STREET DESIGN ELEMENTS

The following elements influence the potential for redesign. Some of them are a direct opportunity to redesign while others may be adjusted to accommodate a new feature:

- Curb ramps
- Crosswalks
- Driveway widths, offsets, flares and radii design, sight triangles
- Alleys and on-street parking and loading areas, parking spaces, drop-off pickup etc. diagonal parking
- Fire access requirements
- Street furniture, bus shelters, newspaper boxes, benches, trash, bollards tree grates
- Advertising signs, traffic light poles and controls
- Sidewalk cafes (6-foot clear walkway required), bollards, tree grates



*Maxwell Street Market Permeable Paver Lot*



*Solar/Wind Powered light*



*Bus Shelter with Greenwall Trellis - Financial Place and Congress Parkway*



*Permeable Paver Diagonal Parking - North Maplewood Ave.*



*Textured Asphalt Crosswalk*

### 4.5 USE OF THIS MANUAL

Within the city of Chicago, the “public way” is defined as city highways, streets, alleys, and public right-of-way dedicated or commonly used for utility purposes and water. CDOT manages and regulates the public way, and although CDOT performs the majority of work within the public way, many other private companies and public departments and agencies also work within this area.

The table below identifies the trial requirements by project type for sister departments, agencies, utilities, and private developers who work in the public way. Prior to formally adopting these requirements, CDOT will perform pilot studies with these organizations, incorporating their feedback and lessons learned before finalizing a mandatory set of requirements.

	REQUIREMENTS				
	Water	Materials & Waste	Energy	Urban Ecology	Commissioning & Maintenance
<b>Department of Water Management</b>					
Capital Water Projects	W1b, W2, W6, W7, W8, W9, W4	All Requirements, except W6			CM4
Capital Sewer Projects	W1b, W2, W6, W7, W8, W9, W4	All Requirements, except W6			CM4
Water Repair Projects	W7	All Requirements, except W6			CM4
Sewer Repair Projects	W7	All Requirements, except W6			CM4
<b>Utilities</b>	W7	All Requirements			CM4
<b>PBC</b>	W1b, W2, W6, W7, W8, W9, W4	All Requirements, except W6		All Requirements	CM4
<b>CTA</b>	W1b, W2, W6, W7, W8, W9, W4	All Requirements, except W6	EN1, EN2, EN4-EN8	All Requirements	CM4
<b>Development Funded</b>	W7, W8	All Requirements	EN1, EN2, EN4-EN8	All Requirements	CM4

**CDOT** The main audience for this manual is CDOT, so the use of this manual by CDOT will follow the process identified in Sections 4.1 to 4.3.

**PRIVATE DEVELOPMENT** Private developers within Chicago often perform work within the public way managed by CDOT. The scopes of work within the public way will vary based on the development proposal, but they will frequently include streetscape improvements.

Depending on the scope of work within the public way, the requirements outlined in Section 2.3 of this manual will apply to work performed by private developers within the public way. The developer will work with CDOT's Complete Streets director to establish the list of requirements that apply for each individual project

**UTILITIES** Utility agencies that service Chicago frequently require access to the public way, since many of their utilities are located below grade within the public way. Typical utilities include, but are not limited to gas mains and services; electrical manholes and conduits; telecommunication manholes and conduits; utility poles; and aerial cable television and telecommunications cables.

Depending on the scope of work within the public way, the requirements outlined in Section 2.3 of this manual will apply to work performed by utility agencies within the

public way. The individual utility will work with CDOT's Complete Streets director to establish the list of requirements that apply for each individual project.

**SISTER AGENCIES** The City of Chicago has an established list of sister agencies that include the following:

- Chicago Public Schools (CPS)
- Cook County of Illinois
- Chicago Housing Authority (CHA)
- Chicago Park District (CPD)
- Chicago Transit Authority (CTA)
- City Colleges of Chicago (CCC)
- Metropolitan Pier & Exposition Authority (MPEA)
- Metropolitan Water Reclamation District of Greater Chicago (MWRDGC)
- Public Building Commission (PBC)

Depending on the scope of work within the public way, the requirements outlined in Section 2.3 of this manual will apply to work performed by sister agencies within the public way. The sister agencies will work with CDOT's Complete Streets director to establish the list of requirements that apply for each individual project.

### **GOVERNMENTAL AGENCIES**

Governmental agencies include other federal and state agencies that are not considered sister agencies that perform work within the public way. Examples include the Illinois

Department of Transportation, the Illinois Department of Natural Resources, and the U.S. Environmental Protection Agency. Depending on the scope of work within the public way, the requirements outlined in Section 2.3 of this manual will apply to work performed by governmental agencies within the public way. The governmental agencies will work with CDOT's Complete Streets director to establish the list of requirements that apply for each individual project.

**SISTER DEPARTMENTS** Sister departments include the many other departments with Chicago that perform work that affects the public way (e.g., Chicago Department of Water Management, Chicago Department of Housing and Economic Development, etc.).

Depending on the scope of work within the public way, the requirements outlined in Section 2.3 of this manual will apply to work performed by sister departments within the public way. The sister departments will work with CDOT's Complete Streets director to establish the list of requirements that apply for each individual project.



# 5.0 CONCLUSION

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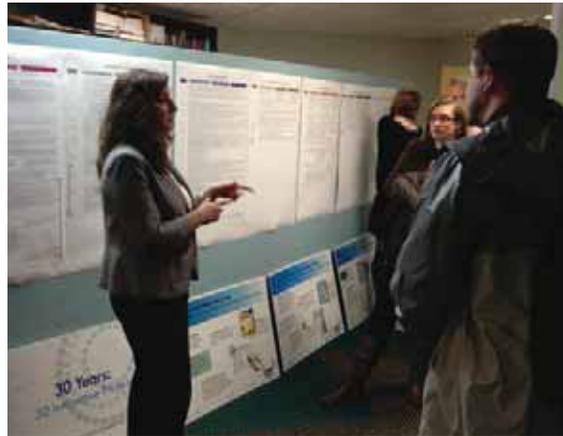
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## 5.1 PUBLIC PROCESS AND PROFESSIONAL CONTRIBUTIONS

This document was produced and refined through workshops and discussions with CDOT project managers, agencies, non-profit organizations, and industry. Also, a series of public meetings were held that provided key public input into the document.



Peggy Notebaert Nature Museum  
January 29th



Center for Neighborhood Technology  
January 29th



Chicago Center for Green Technology  
January 30th



Chicago Metropolitan Agency for Planning,  
January 31st



Southeast Environmental Task Force,  
February 6th



Greater Auburn Gresham Development Corporation,  
February 7th

## 5.2 ON-GOING COMMITTEES

A series of committees have been identified to continue the refinement of the sustainable infrastructure process for CDOT. These committees will help to define additional CDOT policies related to sustainable infrastructure. These committees will review the commissioning data from new projects that follow these requirements and strategies and help to refine the existing requirements as a result of the data.

The committees organized for continuing work include:

**Project Delivery, Documentation, & Tracking:** This workgroup will clarify the proposed checklists, confirm the tracking process within the department, and confirm the appropriate project assignments for the requirements.

**Policy Implementation:** This workgroup will identify and clarify appropriate policies, refine policy language, and map out and initiate policy implementation

**Data & Performance Metrics, Commissioning:** This workgroup will coordinate with other groups and efforts to identify existing data sets and owners, confirm the access to data and clarify the best way to deploy within the department, ensure the data is easily accessible, clarify performance metrics for requirements, and develop the process for commissioning data to be fed into and inform future design processes.

**Outside Stakeholder:** This workgroup will confirm appropriate submittals and the process for accommodating requirements among private developers and other agencies and departments, confirm specific projects to pilot the requirements, and develop a process to clarify projects that must adhere to the guidelines.

**Specifications & Details:** This workgroup will determine which of the department's standard specifications need to be revised, develop a list of proposed revisions and initiate the revision process, determine which standard drawings need revision and initiate those revisions, and identify near-term opportunities for the inclusion of specifications.

## 5.3 ACKNOWLEDGEMENTS

In addition to the Task Force mentioned above, CDOT would like to thank the many dedicated staff and members of the professional community and interested citizens who contributed to the success of this document.

### ACKNOWLEDGEMENTS

Rahm Emanuel, Mayor

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CDOT Project Managers

Gerardo Garcia

David Leopold

CDOT Contributors

Janet Attarian

Consultant Team

Parsons Brinckerhoff

Conservation Design Forum

Site Design Group, Ltd.

Metro Strategies

## 5.4 TASK FORCE MEMBERS

### CDOT SUSTAINABLE STREETS DESIGN GUIDELINES TASK FORCE MEMBERS

Name	Agency	Name	Agency
Michael Alvino	CLOCC	Mark Maloney	
Jay Behnke	State Testing/IRTBA	Joe McCarthy	City of Chicago Dept. of Streets & San; Forestry
Michael Berkshire	Chicago Housing and Urban Development	Marty Mele	Pan Oceanic Engineering
Deeta Bernstein	PBC	Bob Myers	CDOT - DEO
Scott Bernstein	CNT	John Murray	MWRD
Karen Bielarz	LAW	Bob Newport	EPA Region 5
Andrew Billing	Water	Marisa Novara	MPC
Dan Burke	CDOT - Engineering	Sid Osakada	Sewer
Suzanne Carlson	CDOT- Project Development	Karl Peet	CTA
Tom Carney	CDOT in house construction	Melinda Pruett-Jones	Chicago Wilderness
William Cheaks		Robert Richardson	
Josh Ellis	MPC	John Sadler	CDOT- Engineering
Doug Farr	Farr & Assoc	Christina Schroeder	MWRD
Mark Fornaciari	CDOT In-house Construction	Julian Silva	CDOT- Engineering
John Fortmann	IDOT Bureau of Local Roads and Streets	Peter Skosey	MPC
Steve Gillen	Tollway	David St. Pierre	Executive Director, MWRD
Jon Grosshans	EPA Region 5	Mason Throneberg	Ch2MHill
Zubair Haider	IDOT: Bureau of Local Roads and Streets	Tom Van Dam	CTL Group
Benet Haller	DHED	Rick Wanner	IDOT - Landscape Architect
Luann Hamilton	CDOT - Project Development	Karen Weigert	City of Chicago Mayor's Office
Aaron Joseph		Maureen West	CDOT-Project Development
Gabe Klein	CDOT - Commissioner and Honorary Chair	Sean Wiedel	CDOT - Commissioner's Office
Aaron Koch		Cindy Williams	CDOT - Senior Project Director
Scott Kubly	CDOT	Nancy Williamson	IDNR Green Cities Campaign Manager
Paul Lippens	Active Transportation Alliance	Ryan Wilson	CNT
Amy Malick	Aviation/O'Hare - Dep Commr Sustainability	John Yonan	Cook County
		Chris Holt	IDOT

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**STAKEHOLDER ORGANIZATIONS**

2im  
 49th Ward Green Corps  
 Active Transportation Alliance  
 AIA Chicago  
 Alliance for a Greener South Loop  
 Alta Manu  
 AAA Engineering  
 APA Chicago  
 ASCE Illinois  
 ASCE TD & I Chair  
 ASCE Sustainability Committee  
 Bigane Paving  
 Black Contractors United  
 Camiros  
 Cannon  
 CBBEL  
 Portland Cement Association  
 Ch2MHill  
 Chicago Botanic Gardens  
 Chicago Loop Alliance  
 Chicagoland Chamber of Commerce  
 Ciorba  
 CMAP  
 Center for Neighborhood Technology (CNT)  
 CNU  
 Huff & Huff  
 Hyde Park Community Council  
 CTE  
 DHED  
 Edgewater Environmental Sustainability  
 Project  
 FHWA Resource Center  
 Field Museum  
 Friends of the Parks

Federal Transit Authority (FTA)  
 Garfield Park Conservatory Alliance (NCP)  
 Green Leaf Advisors  
 HACIA/Hispanic American Construction  
 Industry Association  
 HDR  
 Illinois Department of Transportation (IDOT)  
 Infrastructure Engineering  
 IRTBA  
 Knight Engineers & Architects  
 KSA Lighting  
 Logan Square Neighbors Association  
 Morton Arboretum  
 National Complete Streets Coalition  
 Complete Streets Coalition consultant  
 Northwestern  
 Openlands  
 Ozinga  
 Patrick Engineering  
 PBC/Cannon  
 Purdue University  
 Philips  
 Pizzo  
 Southeast Environmental Task Force  
 Stanley Consultants  
 Studio Gang  
 Terra Engineering  
 The Care of Trees  
 T.Y. Lin International Group  
 University of Illinois at Chicago (UIC)  
 Unilock  
 University of Chicago  
 University of Michigan  
 UrbanLabs

USDA  
 USGS  
 Vulcan Materials  
 WES Landscape Architects  
 Wicker Park/Bucktown Chamber of  
 Commerce  
 Wight & Company  
 Will Group  
 WRD Environmental  
 Hoerr Schaudt Design  
 Loyola  
 F H Paschen, SN Nielsen & Associates  
 Civiltech Engineering  
 K-Five Construction  
 Chicago Testing Laboratory  
 HNTB Corporation  
 Alfred Benesch & Company  
 Gallagher Asphalt & Company  
 V3 Companies of IL  
 James McHugh Construction  
 Thomas Engineering Group  
 Trice Construction company  
 Ciorba Group  
 STV Inc.  
 Autumn Construction Services  
 Burns & McDonnell  
 Kiewit Infrastructure  
 Aldridge Electric  
 Prairie Materials  
 Rubinos and Mesia Engineers  
 STATE Testing  
 OMEGA  
 Regina Webster & Associates  
 Stanley Consultants  
 DuSable, Inc.

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Center for Neighborhood Technology (CNT)  
Illinois Road & Transportation Builders Association (IRTBA)  
Peggy Notebaert Nature Museum  
Center for Neighborhood Technology  
Chicago Center for Green Technology  
Chicago Metropolitan Agency for Planning  
Southeast Environmental Task Force  
Greater Auburn Gresham Development

## 5.5 GLOSSARY

**Bioswales:** Bioswales are landscape elements that remove silt and pollution from surface runoff water. From: <http://en.wikipedia.org/wiki/Bioswale>

**Combined Sewer Overflows (CSOs):** Combined Sewer Overflows (CSOs) are part of a Combined Sewer system that collects waste water and storm run offs and takes them to a water treatment facility. However when the water entering the sewers exceeds the combined sewer's capacity, the CSOs divert the excess water directly to a body of water. This untreated water can pollute our waters and environments. From: <http://www.epa.ohio.gov/dsw/cso/csoindex.aspx>

**Life Cycle Cost:** The amortized annual cost of a product, including capital costs, installation costs, operating costs, maintenance costs, and disposal costs discounted over the lifetime of the product.

**Permeable:** Permeable pavement allows stormwater to be filtered as it goes through the pavement's surface.

**Post-Consumer Recycled Content:** Post-consumer material is material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item.

**Pre-Consumer Recycled Content:** Pre-consumer material is material diverted from the waste stream following an industrial process, excluding reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process. Synonyms include post-industrial and secondary material.

**Recycling:** The series of activities—collection, separation, and processing—by which products or other materials are recovered from the solid waste stream for use in the form of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion.

**Renewable Energy:** Energy resources such as wind power or solar energy that can be produced indefinitely without being depleted.

**Sustainability Valuation:** Sustainability Valuation is a way to assess sustainability performance through values and opportunity costs rather than burdens. This incorporates environmental costs and benefits in dollars to make a cost-benefit ratio. From: SUIG presentation [http://en.wikipedia.org/wiki/Sustainable\\_Value](http://en.wikipedia.org/wiki/Sustainable_Value) & SUIG presentation

**Sustainability:** Sustainability is the capacity to endure. Practical application of sustainability thinking recognizes how current decisions affect the capacity of current and future generations to lead healthy and rewarding lives.

**Sustainable Transportation:** Transportation that does not rely on the use of fossil fuels.

**Sustainable Urban Infrastructure Guidelines (SUIG):** The Sustainable Urban Infrastructure Guidelines and Policies is a document by the Chicago Department of Transportation (CDOT). It is to aid in the integration of sustainability into planning, design, construction and maintenance. From: SUIG Presentation

## 5.6 PHOTO CREDITS

### Cover Photos

Front - Rodger's Park Streetscape

Back - Rodger's Park Streetscapez

### Chapter Cover Photos:

Chapter 1 - Western Avenue Rain Garden

Chapter 2 - Maxwell Street Market

Chapter 3 - Infiltration Swale along Cermak Road

Chapter 4 - Water Feature at Juarez High School

Chapter 5 - Cermak Streetscape planters in Autumn

All photography has been provided by Chicago Department of Transportation, Parson's Brinckerhoff, and Site Design Group except the following:

### Google Street View

Page 95, 99 and 105 (existing conditions photos)



